HELSINKI SCHOOL OF ECONOMICS (HSE)
Department of Accounting and Finance

PRODUCT PORTFOLIO MODELING IN INTERNAL CORPORATE VENTURING ENVIRONMENT

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6.5.2007

Tuotesalkun mallintaminen yrityksen sisäisen riskisijoittamisen yksikössä

Tavoitteet

Tutkielman tavoitteena oli tutkia miten yrityksen sisäisen riskisijoittamisen yksikössä johdon tulisi mallintaa tuoteportfoliotaan. Lisäksi tutkimuksen kohteena oli kehittää mahdollisesti uusia työkaluja ja ohjeistuksia tutkimuksen kohteena toimineen Nokia Ventures Organizationin käyttöön, mikäli tutkimustulokset siihen kannustaisivat.

Tutkimusmenetelmät

Tutkielmassa esitettiin konstruktiivisen tutkielman periaatteet, yrityksen sisäisen riskisijoittamisen yksikön peruspiirteet ja tavoitteet sekä olemassa olevat tuotesalkun eri mallintamistyökalut. Tutkielmassa pyrittiin selvittämään yksikön sisäisten tarpeiden kautta jo olemassa olevien mallien sopivuutta sisäisen riskisijoittamisen ympäristöön. Lisäksi kehitettiin uusia mallinnustyökaluja haastatteluista saatujen tekijöiden avulla, joiden toimivuutta ja sopivuutta testattiin yksikössä reaaliarvoin.

Tulokset

Tutkimuksen kohteena olleessa yksikössä käytettyjen tuotesalkun mallinnustyökalujen osalta havaittiin kehitystarvetta. Lisäksi todettiin jo olemassa olevien mallien vastaavan huonosti tutkimusympäristön tarpeisiin. Konstruktiiviseen tutkimukseen liittyvän innovoivan kehitystyön tuloksena kehitettiin uusia mallinnustyökaluja kuvaamaan yksikön tuotesalkkua. Tutkimuksen mukaan uusien mallien todettiin havainnoivan paremmin tuotesalkkua kuin aiemmin esitetyt mallit. Kehitystyön perusteella saadut uudet mallit otettiin käyttöön tutkimuskohteessa ohjatusti, ja taloudellisesti vastuullisten henkilöiden toimesta.

Avainsanat: Tuotesalkun mallintaminen, yrityksen sisäisen riskirahoituksen yksikkö, mallinnustyökalut, konstruktiivinen tutkimus.

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ABSTRACT

6.5.2007

Product Portfolio Modeling in Internal Corporate Venturing Environment

Objective of the Study

The objective of the study was to examine how the product portfolio should be modeled in internal corporate venturing environment. The aim of the study was also to develop new tools and recommendations to Nokia Ventures Organization based on whether the results of the research would support it.

Methodology

Principals of the constructive study were presented and followed; fundamental characteristics and focus areas of internal venturing units were presented along with the prevailing portfolio modeling tools. In the study the aim was to find out through empiric results the suitability of the existing portfolio modeling tools in an internal corporate unit. New portfolio modeling tools were innovated, developed and tested based on empiric results, specific venturing factors and values obtained from the case unit.

Key findings

Portfolio modeling tools that were in use in the case unit were found to require some further development. Also the models that were presented in literature poorly fit the requirements of the venturing environment. Based on the innovativeness of the constructive study several new models were developed to depict the portfolio of the venturing unit. New innovated models were taken into use in the case unit in the supervision of several managers that were responsible for the financial results of the unit.

Keywords: Product portfolio, internal corporate venturing unit, modeling tools, constructive study.

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Although the study was exhausting, it was in the same time very rewarding. The process itself was very comprehensive, and had an impact on my every daily life -sometimes the best ideas came in most unexpected situations.

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1. Introduction

1.1. Motivation

Competition in today's technology oriented industries is fierce as every corporation has to ensure their future competitiveness in the changing market environment by being a step ahead of the others. One could argue that it is rather common in the technology industry that companies try to foretell and develop new technologies many years ahead and broaden the scope of their main business. To boost these plans many corporations have set up their own business incubating units to develop products for the future years which also at the same time can widen their business range from the current key core-know-how. These particular units are called internal venturing units. In order to succeed in the future's competitive environment, a venturing unit must be able to organize its product portfolio effectively.

The issue of portfolio management has been quite widely discussed in literature - first well-known models come back from the early 1970's. Despite its' popularity, the emphasis has mainly been on prioritising different kinds of product development projects. Yet technology choices have become increasingly challenging, owing to increasing cost and complexity of technology, global competition, accelerated industrial change, competing technical standards, and reducing product development cycle times (Phaal et al. 2001, 2).

Based on the previous, this study focuses in solving questions around the product portfolio of a venturing unit. The purpose is to examine the old and well-established theories and models, and compare them to a profoundly new frame of business, where cash flows rarely turn positive for several years to come. Corporate venturing unit offers a totally new kind of perspective to the field of portfolio modeling which I will enlighten in this study. How well the old models fit to the new environment will also be

examined in the study. Even though technology choices will not be discussed in this study, one has to keep in mind that the case organization ventures in the field of technological inventions. In conclusion the portfolio management models are developed to assess and to improve the quality of the decision-making of the venturing organization.

1.2. Research problem

The research problem of the study is:

- How should the management model the product portfolio in Nokia Ventures Organization?

Modeling the product portfolio refers in this study, to the situation where one can view the projects or products under development as commensurable, and to revise them through a common model. This enables the possibility to make strategic choices between the projects. Typically these problems are complex and multidimensional, and require elaborate analysis that considers the problem from various viewpoints. Although the study focuses strongly on the managerial viewpoint the aim of the analysis is not to give any kind of recommendations in how or when to make strategic choices within the portfolio.

To support the research question, following sub-questions are defined:

- What kind of portfolio models can be found in the literature?
- How well do portfolio models support the venturing environment?
- What are the key factors in the venturing environment?
- How could the selected and developed portfolio model or models be used in practice in Nokia Ventures Organization to assess and improve the decision-making?

1.3. Objectives of the study

The main objective of this study is as follows:

- To give recommendations to Nokia Ventures Organization on how to model their product portfolio.

To support the main objective, following sub-objectives are defined:

- To review literature of portfolio modeling that could help in selecting or developing a suitable portfolio model
- To discover which portfolio modeling factors are most important to the case company unit and can they be commensurably modeled
- To evaluate the practical usability of selected models for portfolio management in Nokia Ventures Organization.

The relationships between the research questions and research objectives are presented in Figure 1.

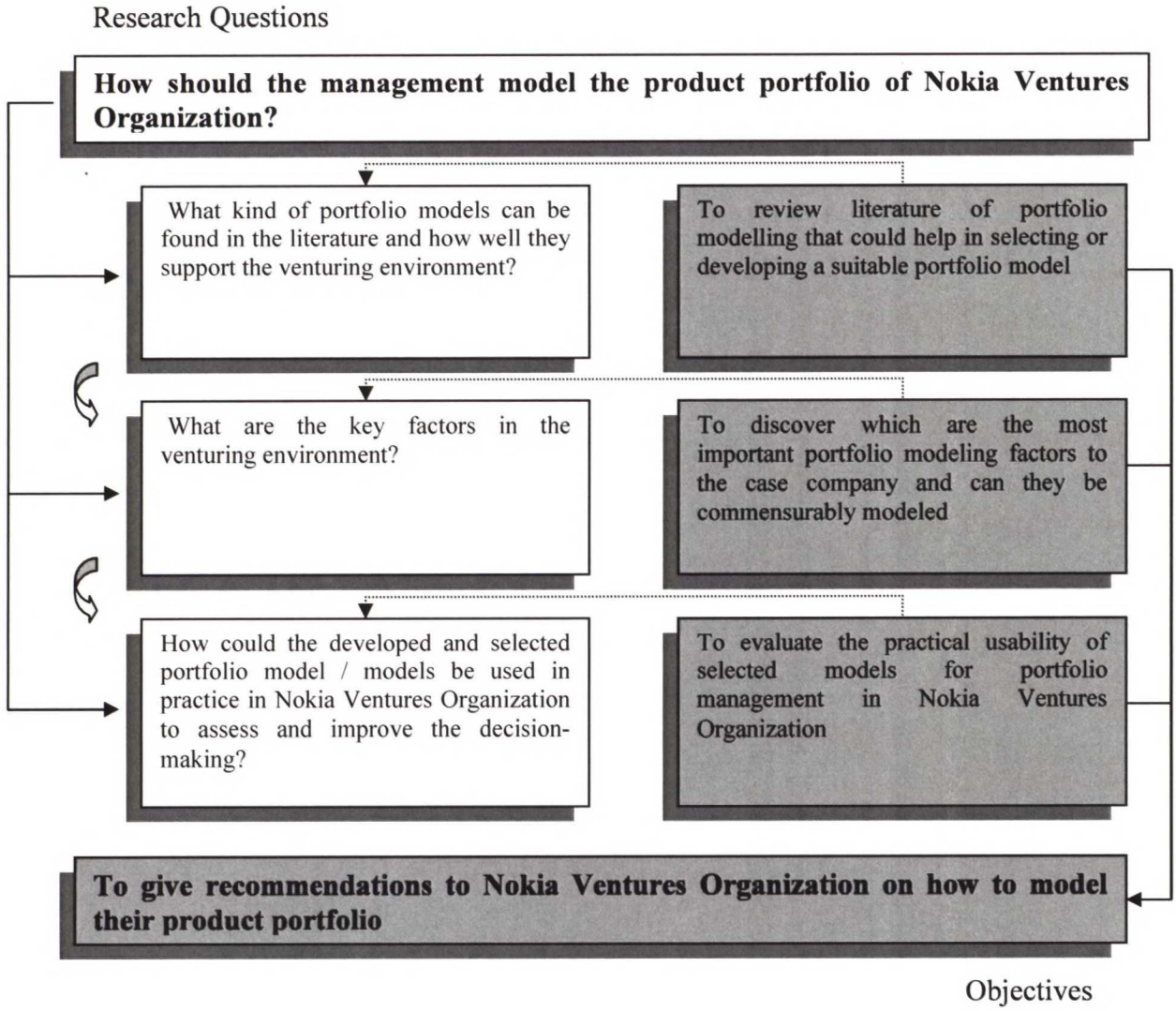


Figure 1 The research questions and objectives

1.4. Scope of the study

Every research needs a scope in order to make the study deep and not broad. The following limitations were made to deepen the study, and to give guidelines for the research:

- No recommendations in choosing between different projects are made due to the objective to find out the way to model the portfolio.

- Even though the venturing environment of the study focuses strongly to technological products and solutions, no recommendations concerning choosing between different technologies are made either.
- Individual products are not discussed in this study which focuses in to the whole portfolio of products.
- The distinction between internal corporate venturing and corporate venturing is that internal corporate venturing is investing into an internal unit within the organization, whereas corporate venturing is investing to an external company. The focus in this study is not to look into corporate venturing in general, nor to take a step to the external side either. Instead the focus on the study is solely on internal corporate venturing.

1.5. Methodology of the constructive approach

The study will be conducted as a constructive case study in Nokia Ventures Organization, where suggestions concerning the portfolio modeling will be given based on the theories and insights of the corporate study.

According to Kasanen et al. (1993, 243), the constructive approach means problem solving through the construction of models, diagrams, plans, organizations, etc. They continue that the process may be characterized by dividing them into the following phases:

1. Find a practically relevant problem which also has research potential
2. Obtain a general and comprehensive understanding of the topic
3. Innovate, i.e. construct a solution idea
4. Demonstrate that the solution works
5. Show the theoretical connections and the research contribution of the solution concept.

6. Examine the scope of applicability of the solution. (Kasanen et al., 2001, 246)

It is important to highlight here that the concept "innovation" and the research phase around it is often heuristic by nature: stricter theoretical justification and testing of the solution typically comes afterwards. Kasanen et al. (1993, 246) also mention that the order of phases may vary from case to case.

In order to follow the guidelines of the constructive approach given by Kasanen et al. (phases 1-6) and to answer the research questions the study will:

1. Introduce the research problem and research potential within.
2. Obtain a general and comprehensive understanding of the topic by introducing the related literature.
3. Obtain data for the empiric research mainly from interviews and questionnaires in the case organization which can be seen as *innovation and construction* of the new solutions.
4. The new models will be introduced, and tested in order to demonstrate whether the constructed solutions work.
5. Theoretical connections of the old and new models in addition with the research contribution will be presented.
6. Study is summed-up and analysed the applicability of the results.

Earlier in his dissertation of 1986, Kasanen makes a case for market-based validation of managerial constructions, arguing that the testing of the pragmatic adequacy of a construction takes time and requires several attempts of application. The following market tests he presented are based on the concept of innovation diffusion, i.e., managerial constructions are viewed as products competing in the market of solution ideas.

1. **Weak market test:** Has any manager responsible for the financial results of his or her business unit been willing to apply the construction in question in his or her actual decision making?
2. **Semi-strong market test:** Has the construction become widely adopted by companies?
3. **Strong market test:** Have the business units applying the construction systematically produced better financial results than those which are not using it? (Kasanen et al., 1993, 253)

Also control checks of the interviews results will be performed, and the constructed models will be re-tested. The actual usefulness of the models will be measured based on the Kasanen et al. market test model which will sum-up the constructive case study.

Kasanen et al. (1993, 253) also note that even the weak market test is relatively strict – it is probably not often that a tentative construction is able to pass. For instance, there is no lack of formal optimization models which supposedly solve managerial control problems but which no one is using in practice. The question whether a construction passes the semi-strong or strong market tests is a typical mainstream accounting research task, requiring statistical analysis of a substantial amount of implementation data, the occurrence of which may take a good deal of time.

As the study is done as a case study, passing the weak market test will be the primary aim of how far the study will be carried out. A more detailed report on how the study is carried out will be demonstrated in the empirical part of the study.

1.6. Limitations

No study is without limitations. In this study one must take under consideration that the undersigned has been an employee of the case organization while the research was

conducted and the results were obtained. All though this is relevant information to point out while using interviews as material, the questions posed to the interviewees did not have the nature that they would have inflicted conflicts with the reliability of the study.

1.7. Structure of the study

This research paper is divided into three major parts: Firstly the introduction to the subject, secondly the case study, and finally conclusions and recommendations. The study starts with introduction on a briefing to the subject. In Chapter 2, I will enlighten the terminology and the field of corporate venturing. In Chapter 3, the most common portfolio modeling principles and models are revised from the aspect of portfolio management. In Chapter 4, a brief analysis of the case company Nokia Ventures Organization (NVO) starts the empirical part of the study. Chapter 5 presents the findings of the most important portfolio factors in the case company. Chapter 6 discusses the operationalization of the selected factors to new models. In Chapter 7, recommendations will be given to NVO to assess the portfolio management. Finally, the study summarizes in Chapter 8. Figure 2 presents the structure of the study.

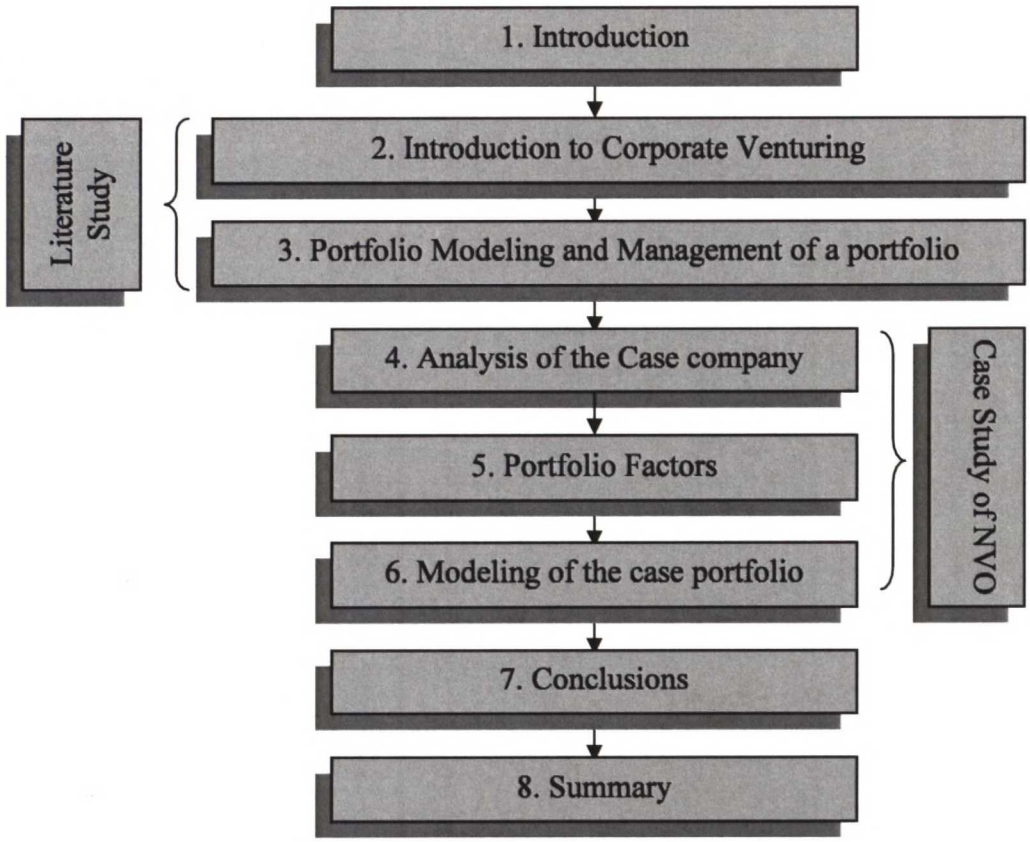


Figure 2 Structure of the Study

2 Internal Corporate Venturing

2.1. Background of Internal Corporate Venturing

This chapter presents the theories related to internal corporate venturing. These theories will act as the foundation and frame once new models and recommendations for the case organization are presented and constructed. In the following, internal corporate venturing can be either addressed to as corporate venturing or venturing in general.

Over the years, enthusiasm for corporate venturing has waxed and waned. At least three different "waves" can be identified in recent history of corporate venturing 1960's, 1980's and the latter half of the 1990's were times when venturing activities experienced relevant upturns. Poor economic conditions resulted a rapid decrease in the volume of corporate venturing in the beginning of the new millennium. (Tukiainen, 2004, 10)

2.2. Terminology of corporate venturing

In literature the terminology of venturing, corporate venturing and internal corporate venturing have been widely discussed. The terms "Internal Corporate Venture" and "Corporate Venturing" have both many different definitions (Sharma et al., 1999, 13). The profound determinations can be however crystallized viewing the common M.O.T dictionary:

Venturing: To dare to do something
Venture: Undertaking or scheme that involves some risk

The relevant observation here is that both definitions have a strong link to uncertainty of what will happen whether something (venturing) is done. From this we apparently come

to the fact that uncertainty always evolves some extent of taking a risk. This rounds up rather well to projections of the future, and thus the necessity of portfolio management of the future products.

Altman et al. (2003, 68) write that corporate venturing is a *growth strategy* to tap into new opportunities that differ from a company's current focus. Guth and Ginsberg (1990, 5) on the other hand write that corporate venturing is the birth of new businesses within an existing organization that transforms the organization through the renewal of key assumptions on which the organization is built.

MacMillan et al. (1985, 34) writes that corporate venturing stands for the *creation of new businesses* within the company and later MacMillan specified the term with Block (Block & MacMillan, 1993, 14) that a business activity is an internal corporate venture when it:

1) Involves an activity new to the organization
2) Is initiated or conducted internally
3) Involves significantly higher risk of failure or large losses than the organization's base business
4) Will be managed separately at some time during its life
5) Is undertaken for the purpose of increasing sales profit, productivity or quality

Burgelman (1983, 223) states that corporate venturing aims at developing *a new product / market base*, around which a new business organization can be built, and which can be integrated into the overall corporate context after reaching maturity.

According to Coveney et al. (2002, 39) new-venture units (NVU's) develop start-up enterprises that can plant company's flag in fresh markets or test and launch innovative

products or services. Companies launch NVU's as separate units so that they can focus on entrepreneurial activities without pressure from business units. To help the new business NVU's have access to the corporate resources such as customer channels and infrastructure. Coveney et al. (2002, 40) also see new-venture units as catalysts for the development of business-building capabilities within the wider company.

2.3. Objectives of venturing

According to Campbell et al. (2003, 30), corporate venturing can be divided into five objectives:

1) The creation of substantial new businesses and growth by incubating a portfolio of promising new ventures. In the study no specific successful business model was found for this objective.
2) Ecosystem venturing: Supports and encourages company's network of customers, suppliers and complementary businesses. In this objective the major pitfall is to lose focus and begin to invest in a wider deal stream and seek greater autonomy that which justified the creation of the unit. To avoid the loss of focus, the unit needs to have clear objectives, both in which sectors to invest and the relative balance between financial and strategic returns.
3) Innovation venturing: traditional functional activities such as research and development. Typically a separate unit alongside the existing function. The unit rewards people for value created, invests in many projects to spread risk, uses joint ventures and links with the venture capital industry, and sets stage-gate targets to help assess progress. In Innovation venturing the major pitfall in innovation venturing is to view the venturing unit as a way of addressing a general concern about lack of entrepreneurial spirit in the company rather than to improve the effectiveness of a specific function. To avoid this, the unit should report to, and be governed by, the function of which it is a part. A small, senior-level team with its own operating budget should manage the unit.

4) Harvest venturing: increases company's cash resources by harvesting its spare intellectual property or other assets. It is a process of converting existing corporate resources into commercial ventures and then into cash. Major pitfall in harvest venturing is that the unit tries to turn spare resources into significant new growth platforms. The unit should be cash-driven to avoid this pitfall – turning the new ventures into cash as soon as possible.
5) Private equity venturing: diversifies a company's business into the venture capital industry. Example: Nokia Venture Partners (NVP). Major pitfall in private equity venturing is hubris. Managers enter a business misjudging both timing and the skills needed. They overpay to poor projects, lose sight and hold on to poor investments. If it is seen that it is reasonable in the first place for the company to get into private equity business, there are three things to keep in mind. First, the unit should be fully separate, and have its own close-end fund. Secondly, it should be staffed with seasoned managers from the private equity industry. Third, the managers should be evaluated and rewarded as in the private equity world.

It is also worth noting that a venture may have positive outcomes even if the venture "fails" financially (MacGrath, 1995, 128). These positive outcomes may be finding new opportunities for the firm, pointing out dead-ends, developing people, creating assets for future offerings, creating image and producing spin-offs or other sold-out arrangements (Tukiainen, 2004, 18) . This gives an additional perspective to the venturing process which in every case does not solely focus on profit.

2.4. Making internal venturing successful

Venturing units need space and autonomy of their own to operate successfully. As Day et al. (2001, 22) write: a company that seeks both performance and growth should give entrepreneurial activities plenty of space but also connect them, from the outset, to its parent's resources, knowledge and goals.

Venture units need also committed sponsorship from the highest level, preferably the CEO or the president of the company to survive in high-level strategic changes or when problems arise and the danger to be killed. This committed sponsorship does not mean a tighter reporting culture, but rather that a senior executive sticks his/her neck out when the VU makes losses. (Birkinshaw et al., 2002, 14)

Birkinshaw et al present (2002, 15) also one way in looking corporate venturing through a life-cycle model which emphasized the need of entrepreneurial skills in a venture organization. In stage one there is an oppressive culture towards entrepreneurship in the organization, and only few new business ideas come from a few entrepreneur-type employees dispersed around the organization. In the second stage a venture unit is created, and through the concept of new venture development it can act as a catalyst for change in the organization. In the third stage the entrepreneurial managers from the venture unit start to provide their services also to other divisions also in helping new ideas to get established. In the fourth stage managers push the change in mainstream business units, sharing responsibility in investment and development decisions. Finally the new vibrant culture alters the old oppressive culture (stage 1). The life-cycle model is presented in Figure 3.

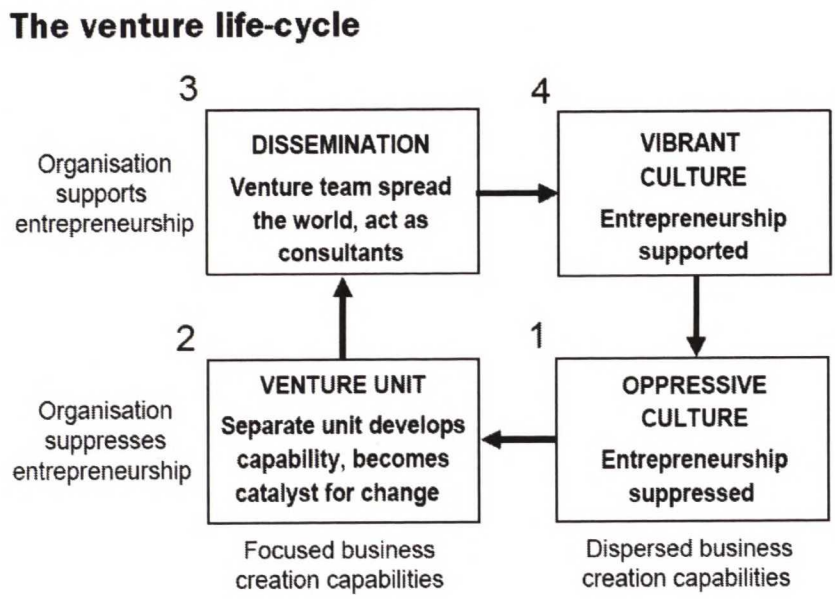


Figure 3 The Venture life-cycle (Birkinshaw et al., 2002, 15)

In venturing timing is also critical. It is important for senior management to insist on the formulation of a clear definition of Go / Kill points for each major milestone. Venture management should also be particularly alert of the following major challenges: securing internal support, convincing the key stakeholders to undertake the project, securing the critical first five deals and aggressively learn from early experience. (MacMillan et al., 1985, 38)

3. Portfolio Management

3.1. Background of Portfolio Management

In this chapter I first go through the definitions of portfolio management and dominant theories. Also Visual mapping is presented and later on I will present the most popular portfolio models which can be presented in maps. These models are The BCG model, GE / McKinsey model, DPM / Shell Model and the Risk-Reward Model.

Portfolio management is a dynamic decision process, where business's list of active new products and R&D projects are constantly updated and revised. In this process, new projects are evaluated, selected and prioritized; existing projects may be accelerated, killed or de-prioritized; and resources are allocated and reallocated to the active projects. The portfolio decision process encompasses or overlaps a number of decision-making processes within the business, including periodic reviews of the total portfolio of all projects; making ongoing Go/Kill decisions on individual projects; and developing new product strategies for the business, complete with strategic resource allocation decisions across business units and strategic arenas. (Cooper et al., 2001, 3)

Dye and Pennypacker (2003, 37) define portfolio management as the art and science of applying a set of knowledge, skills, tools, and techniques to a collection of projects in order to meet or exceed the needs and expectations of an organization's investment strategy. In the case of external delivery projects, the term "investment strategy" must be interpreted from a wider perspective with considerations of "investing to customer deliveries".

Portfolio management for new products is important for business for three main reasons:

- A successful new product effort is fundamental to business strategy.
- New product development is the manifestation of business strategy.
- Portfolio Management is about resource allocation: You squander the scarce resources on the wrong projects, and as a result, starve the truly deserving ones. (Cooper et al., 2001, 8)

Portfolio management for product innovation – picking the right set of development projects – is critical to new product success. It deals with issues such as maximizing the value of the portfolio, hence return on R&D spending; an appropriately balanced portfolio; and a portfolio investment strategy that is aligned with the company's overall business strategy. As Cooper et al stated: "Indeed portfolio management is the manifestation of your business's strategy – it dictates where and how you will invest for the future". (Cooper et al., 2001, 8)

After Cooper et al. (2001, 26) there are three main goals in attaining an effective portfolio management system: *maximizing the value of the portfolio, achieving the right balance of programs in the portfolio* and *aligning programs to company strategy.* Although they may seem apparent, still a question arises when talking of the second goal - achieving the right balance of programs. Does Cooper et al. mean by this balance of various kinds of programs, exit timing, fit to the market or something else? Further reading does not bring answers to the dilemma, so one may only ponder what the aim of the right balance was.

3.2. Portfolio managing methods

The most popular portfolio managing methods according to the research of Cooper et al. (2001, 366) were: financial methods, strategic methods, bubble diagrams or portfolio maps, scoring models, checklists and other methods. Their characteristics and definitions are briefly as follows:

- Financial Methods include various profitability- and return-metrics, such as NPV, RONA, ROI and payback period. Commonly used to compare different projects against each other, or rated against a hurdle rate to make a Go/Kill decision on a project.
- Strategic methods means allocating money and resources between different types of projects, then "pooled" into buckets or envelopes. Projects are then ranked or rated within buckets. Dimensions of the buckets vary greatly, but the most popular are: market, development type (maintenance, exploratory…), product line, project magnitude (major or minor), technology area, technology platform type, area of strategic thrust and competitive need.
- Bubble Diagrams or portfolio maps can be seen as projects that are plotted into an X-Y plot in forms of balloons or bubbles.
- In Scoring models projects are rated or scored on a number of criteria. The scores are then added to a project yield or project sum which comes the criterion for the ranking of different projects.
- In checklists projects are evaluated on base of lists with questions to answer only by YES or NO. Projects must achieve all or a certain number of YES-answers to proceed.
- Finally, 24% of businesses indicate that they use some other method than mentioned above. These other methods revealed in the research to be mostly hybrids of the models above.

From the same field in a comparative analysis of Poh et al. (2001, 72) evaluated the suitability of six popular methods for R&D project evaluation. Poh et al. had selected their six methods to be Scoring, AHP, Decision tree, Economic, Cost / Benefit and Comparative methods. The overall results of this comparative study are presented in Figure 4.

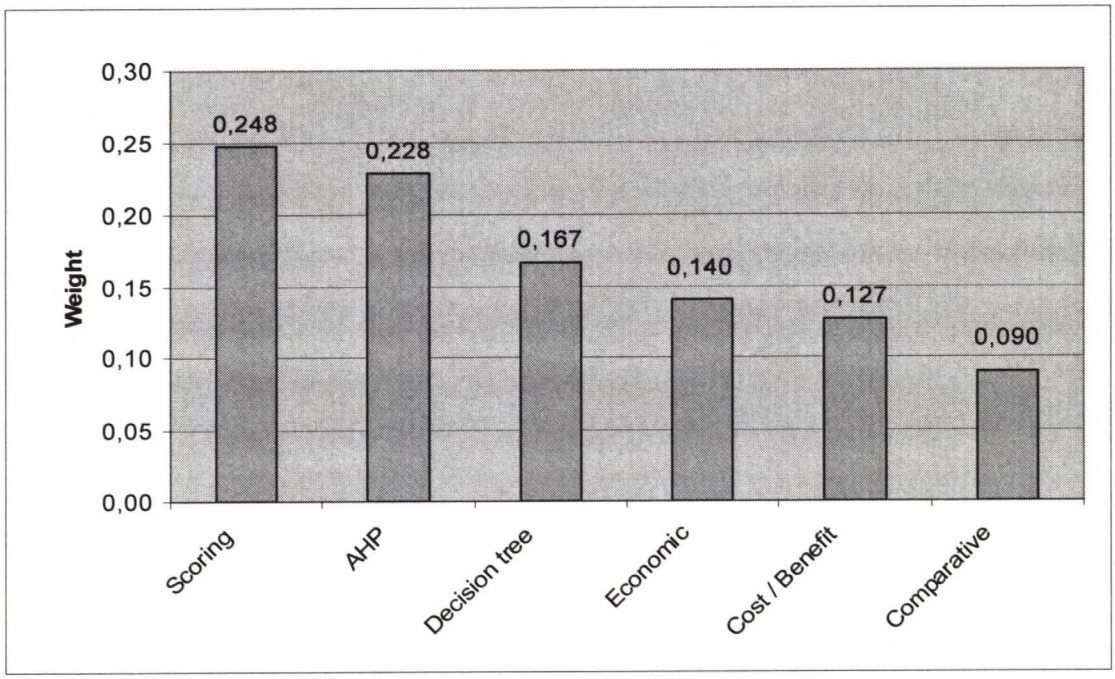


Figure 4 Overall weights for the six R&D evaluation methods (Poh et al., 2001, 72)

The scoring method had the highest weight in the study. The close second in the comparison was AHP (Analytic Hierarchy Process) which scored especially well in situations with multiple objectives. The AHP, not mentioned earlier by Cooper at all, was developed by Saaty in 1982 as a method for comparing a set of alternatives to assist in decision making in a complex environment (Poh et al., 2001, 72). Decision tree analysis is used in situations in which decision-makers face a sequence of decisions, and between each two successive decisions, and outcome of the previous decision intervenes (Martino, 1995, 69).

The decision trees ranked third and the economic analysis fourth. The conclusion of Poh et al. shown in Figure 4 was that the economic analysis fails to deal with multiple

objectives and that the data requirements for it are difficult to meet which makes it a rather unpopular R&D evaluation method. (Poh et al., 2001, 72)

The portfolio managing methods and the R&D evaluation methods were discussed here only in general level. Later the results mentioned above however will help in constructing the justified interviewing method to the study that will be based on the scoring method. In conclusion to this chapter, in their comparative study Poh et al. (2001, 72) stated that "the scoring method is the most favorable method for R&D evaluation."

3.3. Introduction of Visual Mapping

Visual aids in portfolio decision-making have been widely supported in the literature. Cooper et al. (2001, 104) write that bubble diagrams should be part of repertoire of portfolio models - they are effective decision tools which yield correct portfolio decisions in portraying the entire portfolio in a visual format and able to display the balance of the repertoire. Also Koskinen et al. (2003, 42) write that different visual aids, such as bubble diagrams and pie charts can be used to visually represent the portfolio and to support the decision-making.

Many researchers of portfolio modeling have given suggestions in using either multiple methods of modeling, hybrids of the best practices or combinations of these in order to reach a higher level of measuring accuracy and reliability. Wind et al. (1983, 98) suggested that it might be desirable to avoid using a single portfolio model and instead to integrate the various models to take advantage of their unique capabilities: "These hybrid models would allow management to test the sensitivity of the portfolio classification of businesses to various portfolio objectives, definition of variables and

weights". Using only one portfolio model for a base of business strategy it is possible to incur the risk to misplace the positioning of the business in the model. Cooper et al. (2001, 174) agree also in their research that there is no one right portfolio management method and best businesses use a combination or hybrid approach. Lukkaroinen et al. (1990, 28) also agrees that measuring of a strategic business unit never reaches full accuracy due that the success of a strategic business unit is related to multiple factors. He continues that by using a multiple set of portfolio measuring tools, the reliability of measuring a SBU can be increased.

3.4. Portfolio Factors

Wind et al. (1983, 98) stated that based on their research classification of any business into a specific portfolio position in a standardized portfolio model requires examination of the following factors:

1. The operational definition of the dimensions used.
2. The rule used to divide a dimension into low and high categories.
3. The weighting of the variables constituting the composite dimensions, if composite dimensions are used.
4. The specific portfolio model used.

After Cooper et al. (2001, 75) sample a list of ten possible parameters to consider in portfolio visualisation: any pair can be the X- and Y-axes for a bubble plot:

1. Fit with business or corporate strategy (low, medium, high)
2. Inventive merit
3. Strategic importance to the business (low, medium, high)
4. Durability of the competitive advantage (short, medium, long-term)
5. Reward based on financial expectations (modest to excellence)
6. Competitive impact of technologies (base, key, basing and embryonic technologies)

7. Probabilities of success (technical and commercial success as percentages)
8. R&D Costs to completion (dollars)
9. Time to Completion
10. Capital and marketing investment required to exploit

These factors represent a wide number of parameters to consider. In Chapter 5.2, these factors will be revised against the results from the conducted interviews in the case organization.

3.5. Most common Portfolio Models - "The Big Four"

Several portfolio modeling techniques have been developed in the past 25 years. The most common of them are after Segev (1995) the *Boston Consulting Group (BCG) grid*, the *General Electric / McKinsey (GE/McKinsey) matrix* and the *Shell / Directional Policy Matrix (Shell / DPM)*. I have chosen these three matrixes as the basis of my theory study. In contradiction what Segev (1995) wrote about the popularity of the portfolio models, Cooper et al. (2001, 75) denotes that the most popular bubble diagrams are variants of the risk-return diagram. In order to be certain that the most popular models are included in this study I have chosen also the *risk-return matrix* to be included. Later on when all of these four most common Portfolio Models are addressed to as a group, they are called as an exclusive right of the research worker the "*Big Four*".

Boston Consulting Group matrix

The BCG is the best-known portfolio-planning network. The Boston Consulting Group Matrix was developed by the large US consulting group in the early 1970's. It has two factors: market growth and market share. The Matrix is divided into four cells, and the products can be ranked in four categories: Stars, Cash Cows, Problem Childs and Dogs

depending on the placing on the chart. The basic assumptions of the model are that high growth rate implies opportunities, and high market share implies strength. After Segev (1995), the BCG model is the least complex of all its subsequent mutations. It is simple and inexpensive in measurement and application, and easily understandable as a tool to present findings and discuss their strategic implications at board meetings.

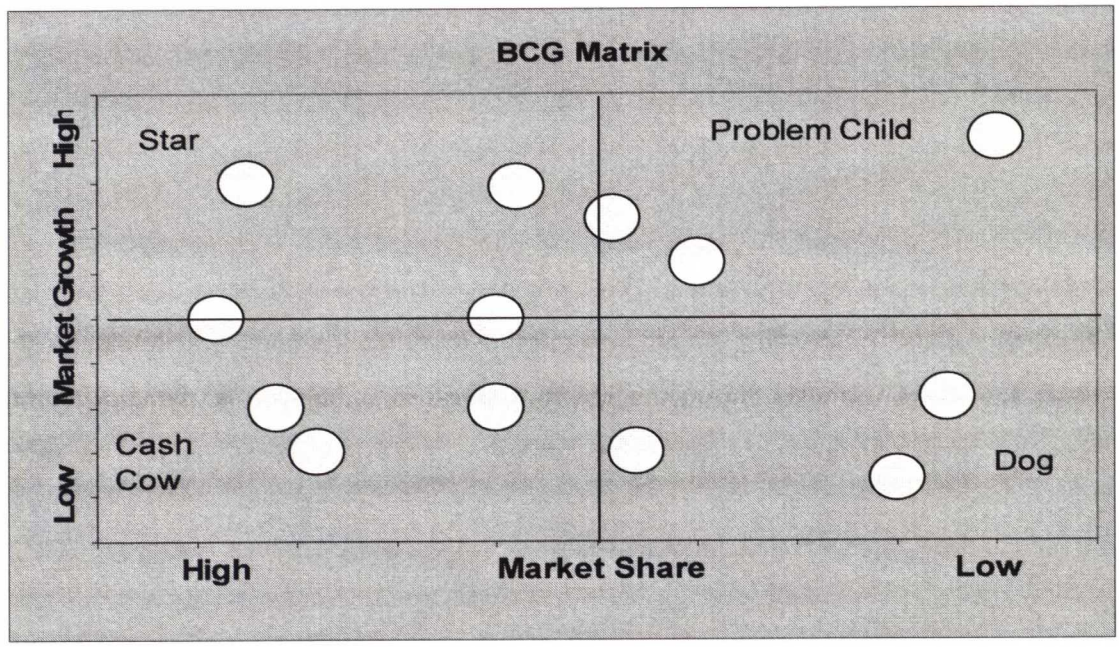


Figure 5 The BCG Matrix

Although the BCG model is the most known of the portfolio models, it has limitations to its use. The BCG model assumes that a higher market share leads to higher profits. After Buzzell et al. (1975, 97) researched on the correlation of these factors and they indicated that a correlation is relevant, but at a lesser degree of significance than assumed in the BCG model. Also it has been discussed that the definition of the market is fuzzy. Segev (1995) also wrote that the importance of market share is overemphasized and that the experience-curve implies to a lesser and lesser degree while moving from consideration of competitive, high-volume markets to consideration

of other types of markets. Ansoff et al. (1990), Wheelen et al.(1992) and Hofer et al. (1978) agreed that a high growth rate is only one measure of the attractiveness of a market. The prescriptive properties of the matrix stimulate portfolio actions that may or may not be productive. This is mainly because it is too narrow and provides a myopic view of the strategic position and options (Derkinderen et al., 1984, 129).

General Electric / McKinsey Matrix

The General Electric (GE)/ McKinsey Matrix is a model to perform a business portfolio analysis on the *strategic business units (SBU)* of a corporation. In the example figure: the sizes of the circles represent the market size; the sizes of the pies represent the market share of the SBU' and the arrows represent the direction and the movement of the SBU's in the future. The GE /McKinsey came popular later in the 1970's. In some versions of the model Competitive Strength is replaced by Relative Market Dominance which eventually comes up with the same issue in the literature. After Segev (1995), the planning focus of the GE matrix is future profit, of the future return on investment. In the model SBU's are rated as candidates for future investment in terms of both quantifiable and non-quantifiable elements. Sales, profit and ROI (quantitative elements) are considered but also various other factors, such as volatility of market share, technology, employee loyalty, competitive stance and social need (less quantifiable) as well.

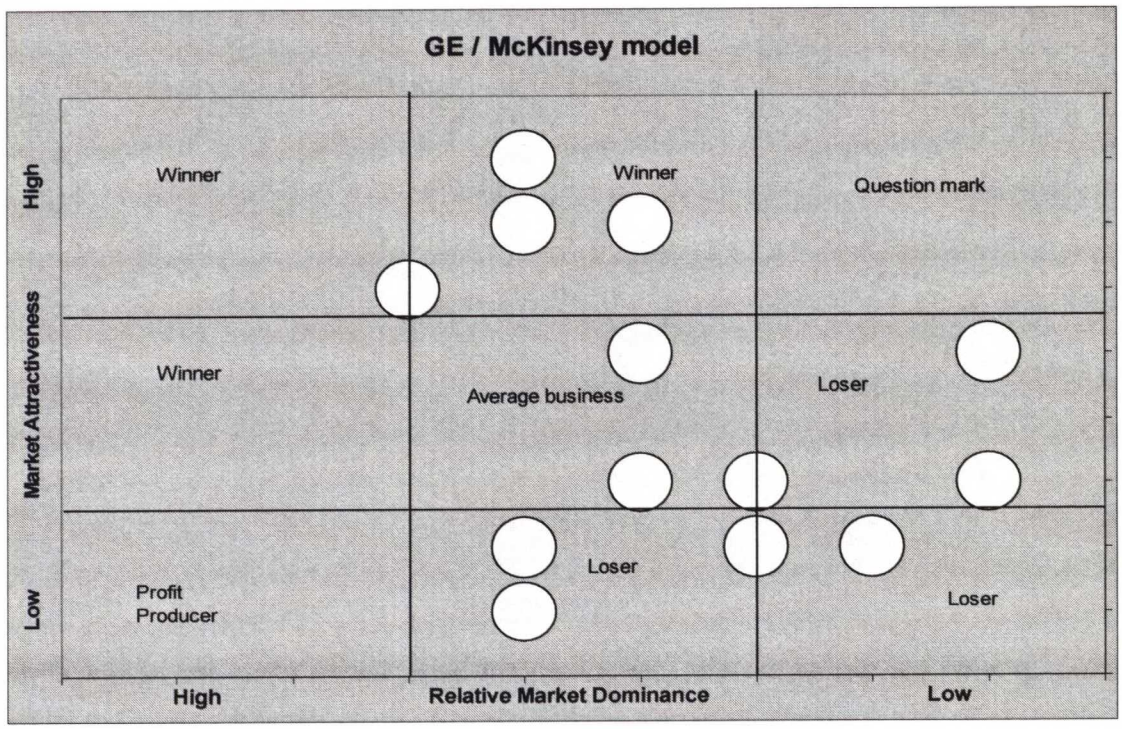


Figure 6 The GE / McKinsey Model

Some criticism of the model exists. After Glueck (1986, 18), there are three main criticisms of the GE model: It leads to 'automatic' strategies which are naïve, generic strategies are too simplistic and serve as a substitute for real in-depth analysis and thirdly the model strategies tend to stifle creativity.

Shell / DPM matrix

The Shell Oil Company developed the Directional Policy Matrix in the 1970's following the widespread implementation of the Boston Matrix. General Electric and the McKinsey Company also contributed to the development of this technique which resulted in what is now known as the GE-McKinsey, or Directional Policy Matrix. In the Directional Policy Matrix, the vertical axis is defined as Market Attractiveness or Business Sector Prospects and the horizontal axes as Competitive Strength. As the other models, also the DPM model is descriptive and prescriptive. One of the main benefits of

the DPM is that it solves the problems of integrating qualitative and quantitative variables into a single portfolio model. (Channon, 1979)

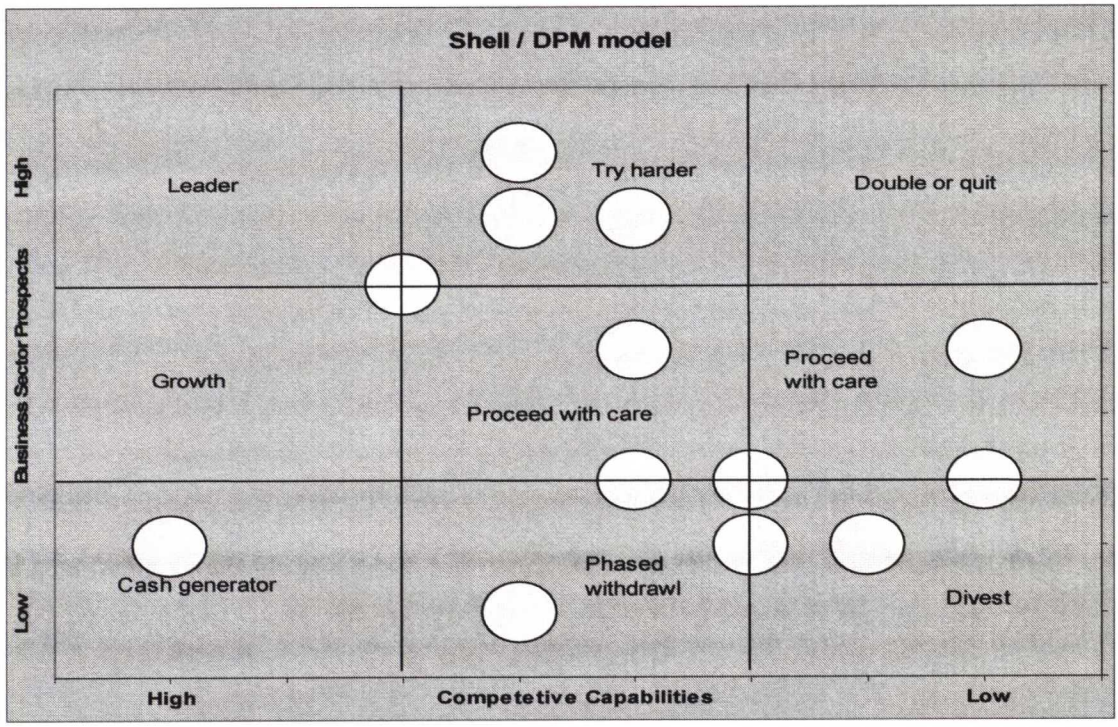


Figure 7 The Shell / DPM model

Mostly the same areas of criticism of the above-presented models exist also in the DPM model. This analysis of every relevant measure and its weight allocations are expensive in terms of resources (Segev, 1995).

Risk-Reward Scoring matrix

A widely used portfolio model is to plot the corporate business units or projects to a risk-reward diagram. On the X-axis is some measure of the project's reward to the company; the other axis is the probability of success, thus risk and reward. In the model in the figure the table is divided into four quadrants: pearls, bread and butter, oysters and white elephants.

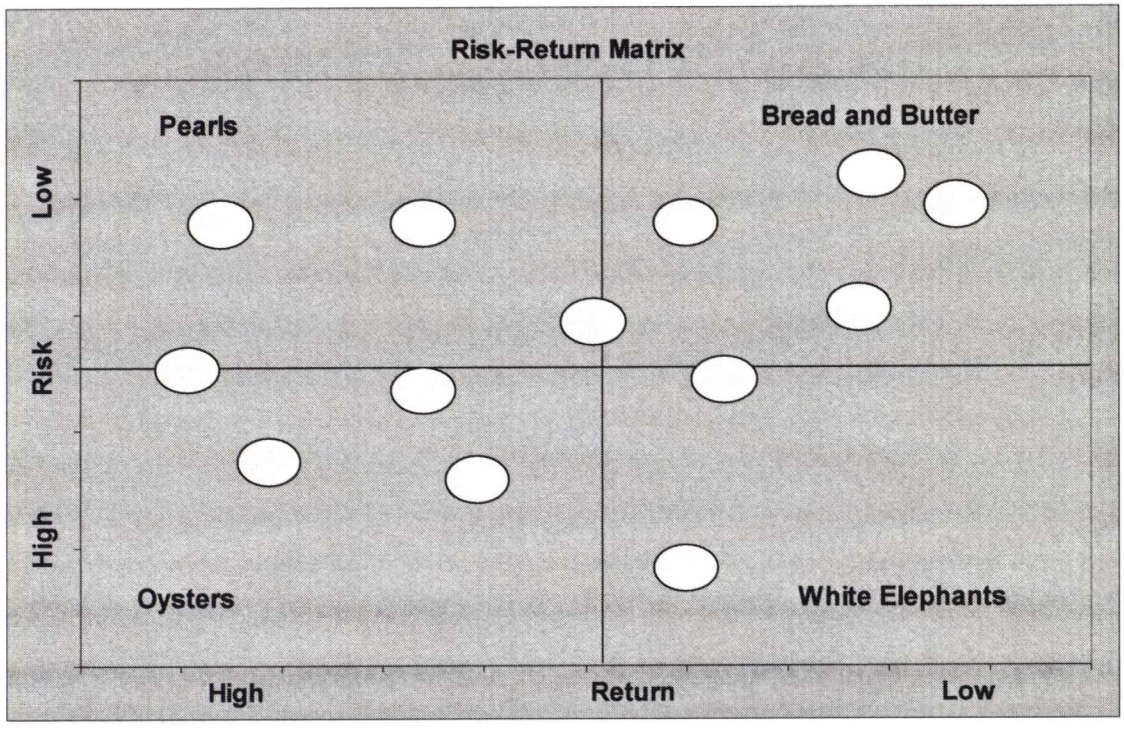


Figure 8. Risk-reward matrix

In many examples of the risk-reward matrix presented in literature, the size of the circles could also denote resource allocation per project so that, given finite resources (people, money) the sum of the areas of the must be constant. This forces management to consider the resource allocation profoundly – adding one project to the list reduces the size of all the other circles.

3.6. Summary

In this chapter portfolio management definitions and dominant theories were presented. It was stated that the scoring method was most suitable evaluation method for R&D projects and that visual mapping was a necessity in portfolio modeling. It was stated also in many sources in literature that using only one method could lead to misplacing the positioning of the business and that in many cases hybrids or combinations of different approaches could increase the reliability of the portfolio modeling and

decrease the possibility of misplacement. Based on the facts mentioned above, the scoring method and the visual mapping were selected to be used more profoundly in the study and in the portfolio model building. It can be therefore concluded that the combination of scoring method and visual mapping should be used in portfolio modeling.

Conclusion 1:
A Combination of the Scoring method and Visual mapping should be used in portfolio modeling

Also the most common portfolio models were shown in this chapter and that the models have many similarities – they all place in a XY-matrix, and have typically quite similar variables between each other. The BCG, GE / McKinsey, Shell / DPM and the Risk-reward matrixes represent the well-established models that have during the years become well-recognized in literature. In the following chapters it will be further sorted out whether these Big Four models can be used in a venturing environment or if there are other possibilities in the field.

4. Introduction of the Case Company

In this chapter the case organization will be presented, and the theory enlightened through the answers obtained from the interviews conducted in the case organization.

4.1. Description of Nokia Ventures Organization

History in Nokia

In 1998 Nokia Ventures Organization was established to contribute to Nokia's renewal by identifying and developing new business opportunities that fall outside the scope or current focus of Nokia's business units. On 2003 Nokia was divided into three main lines of business: Nokia Mobile Phones, Nokia Networks and Nokia Ventures Organization. The turnover of the case division at that time was 366 million euros in the year 2003, with a negative result of 161 million euros and personnel of 1561 employees. In the year 2004 the operations were reorganized, and public reporting of the venturing unit's figures ceased. The new organizational matrix of the business level Nokia is presented in Figure 9, where it includes the four business groups: Mobile Phones (MP), Multimedia (M), Enterprise Solutions (ES) and Networks (NET). Also included are two horizontal groups to support the mobile device groups: Customer and Market Operations (CMO) and Technology Platforms (TP). In addition to these business groups there are also various support functions and research activities, including venturing unit NVO which are not shown in the operational matrix.

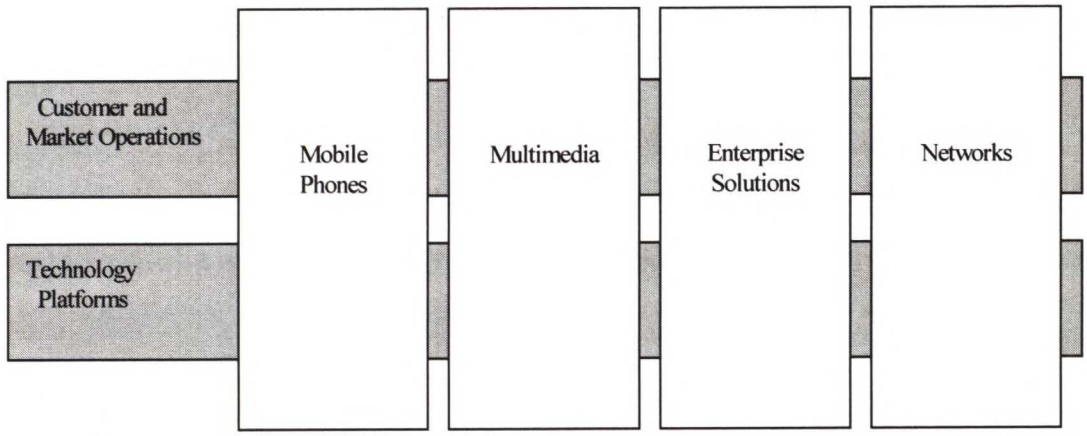


Figure 9 Nokia Business Group Structure

Purpose and success

Nokia Ventures Organization acts as an incubator, nurturing ideas through the development phase to profitable commercialisation. NVO was established to test and develop nascent ideas that had the potential to generate revenues of $500 million to $1 billion within four years. NVO's primary purpose is to develop internally generated projects (Day et al., 2001, 26). New ideas which are developed to ventures will not stay in NVO indefinitely, the viable ones are eventually integrated into the operating businesses, established as new divisions, or sold. NVO deals only with proposals that go beyond Nokia's current technologies and seem likely to create new markets. NVO's function can also be seen as accelerator; it speeds up the development ideas. Businesses that can run on their own leave NVO and either join some of the existing business units, or found new operational units.

Throughout its history, Nokia has renewed its core businesses and created innovative businesses in entirely new areas. Nokia's venturing activity has created independent businesses, contributed to the growth and profit of the core businesses of Nokia, provided financial returns on investments, and has produced intangible assets and insights.

Nokia Ventures Organization has been highly successful in generating new businesses and strong financial returns for its parent company. Rather than creating one unit with multiple or changing goals, NVO has created multiple units, each with its own highly specific goals and its own dedicated team of employees. *New Growth Business (NGB)* is an Innovation Venturing unit, whose objective is to complement the existing R&D activities of the businesses. *Nokia Venture Partners (NVP)* is a private Equity Venturing unit dedicated to providing a financial return by investing in wireless Internet start-ups. In addition, there is the *Nokia Early Stage Technology (NEST)* unit, a harvest venturing unit that invests in promising technologies most of which will end up being spun out of the company. (Campbell et al., 2003, 37)

4.2. Venturing in NVO

The mission of NVO's venturing activity is the renewal of Nokia. NVO expands Nokia's interests towards new areas, but still works within Nokia's broad vision of "Life Goes Mobile." This venturing activity triggers new developments that play a significant role in the renewal of the company. Corporate venturing is business incubation from the idea phase to profitable business as seen on the figure. Ideas that fit into the Nokia vision are collected continuously from both internal and external sources. According to the Nokia web pages the most promising ideas are developed further in the business units where the objectives and competencies best match the scope of the idea and the resources needed to develop it. Figure 10 depicts this venturing process from ideas to mature business.

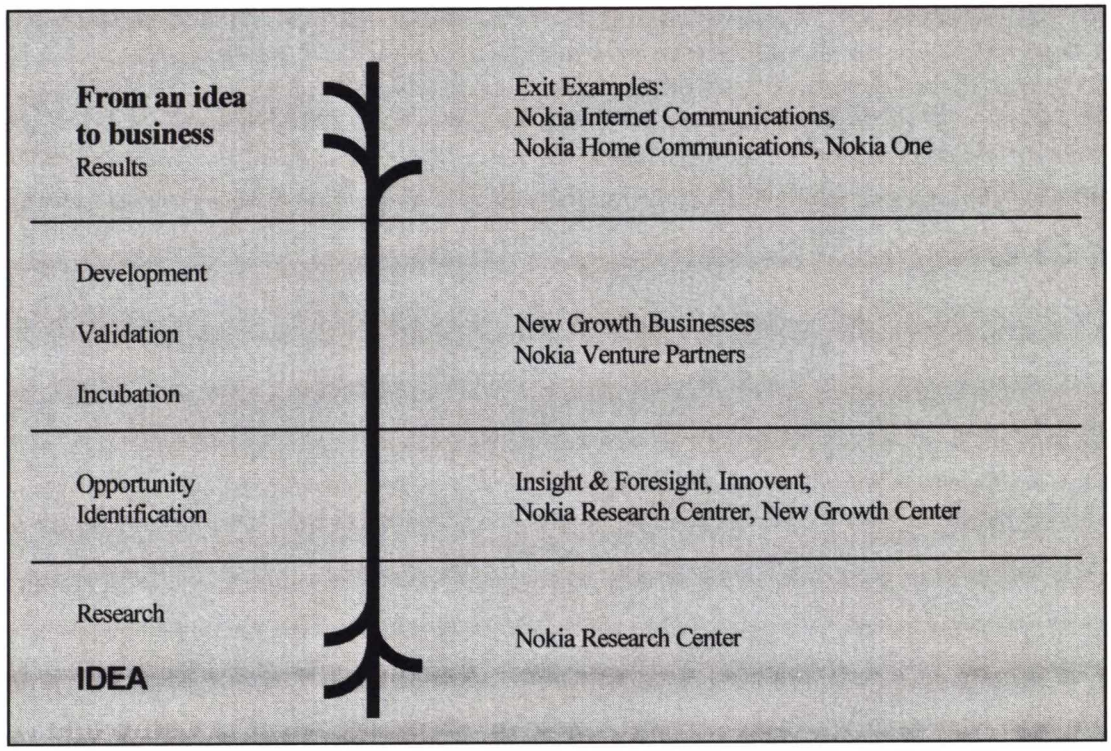


Figure 10 The venturing process at Nokia (www.nokia.com/venturing, 16.4.05)

In order to enable better the venturing environmental benefits to a fruitful business development, Nokia has separated its venturing unit from the operating business units. The organizational chart of Nokia is presented in Figure 11. Even though the top organizational model has changed to matrix form presented earlier, the figure still gives a good grasp of the logic around the present NVO venturing. The major changes are that instead of three business groups presented in Figure 11 (MP, NET and Research Center), there are four: MP, M, ES and NET.

A closer look of the figure reveals a range of mechanisms that closely link the two. The continuous sharing of information between the units ensures that decisions about moving businesses between NVO and the business groups are made jointly. Nokia Ventures Board, most of whose 15 members- including the presidents of NMP (Nokia

Mobile Phones) and of NET (Nokia Networks)– come from the business groups. The board reviews the initiatives as they go through successive funding gates, thereby ensuring that they are accountable to the core business and don't thrift from the shared agenda (Day et al., 2001, 28). This autonomy model agrees well also with the sponsorship theory of Birkinshaw (2002, 14) which was presented earlier in Chapter 2.4.

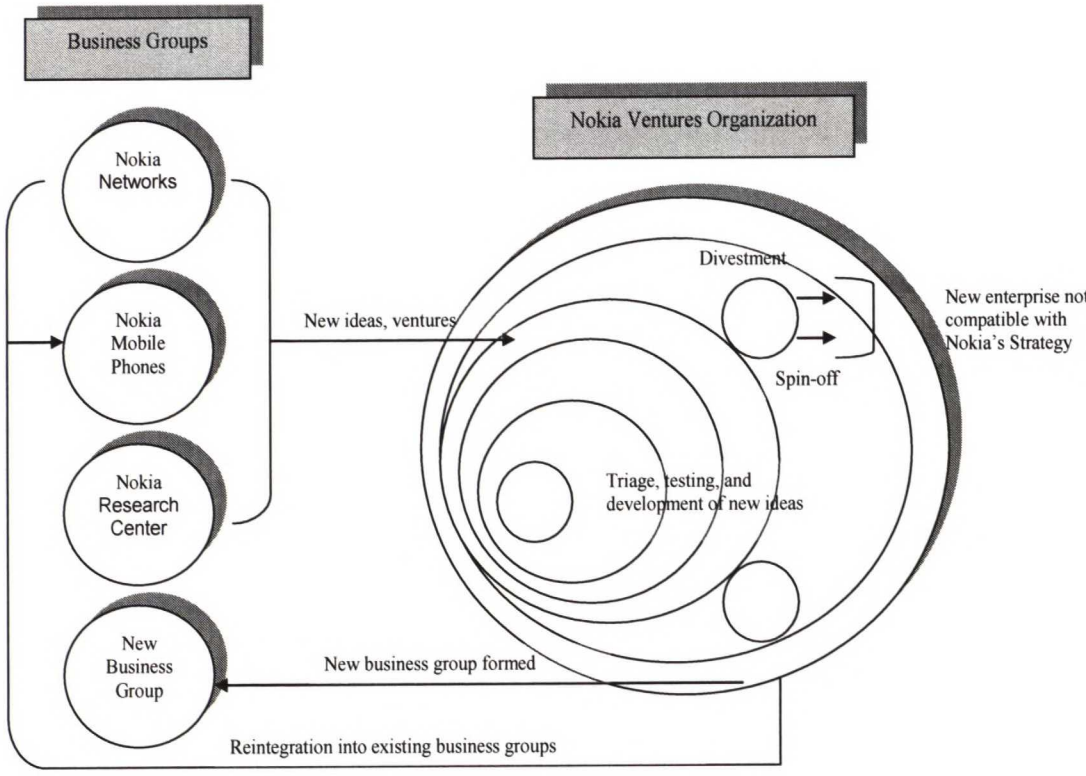


Figure 11 Nokia organizational chart (Day et al., 2001)

NVO has had many success stories in its lifetime. Nokia Internet Communications (NIC), NVO's largest initiative by far, generates several hundred million euros revenue a year (Day et al., 2001, 29). NIC has been transferred to a separate unit in 2001.

The mobile-TV and its DVB-H standards which have been presented to the public in 2004, have been developed in NVO during the previous years. The new mobile-TV has been announced to be launched widely to the consumer markets in the year 2007. Also the fitness sector and RFID technology based solutions have been in the interest of NVO for a while with numerous launched products. Nokia Lifeblog (the multimedia diary) and Nokia One Mobile Connectivity Service (the mobile email enabler) have been also highlighted as products of NVO.

4.3. The V-Process

The internal ventures were developed in NVO using a disciplined staged decision process. Ventures had to pass several formal decision points and continuation decisions of the ventures were made at these points. The ventures were also reviewed between the points. Reviews were carried out regularly by the venturing board that acted as an advisory board and decision maker together with the managers of the ventures. This sums well with the Macmillan's theory of milestone Go/Kill decisions (Chapter 2.4).

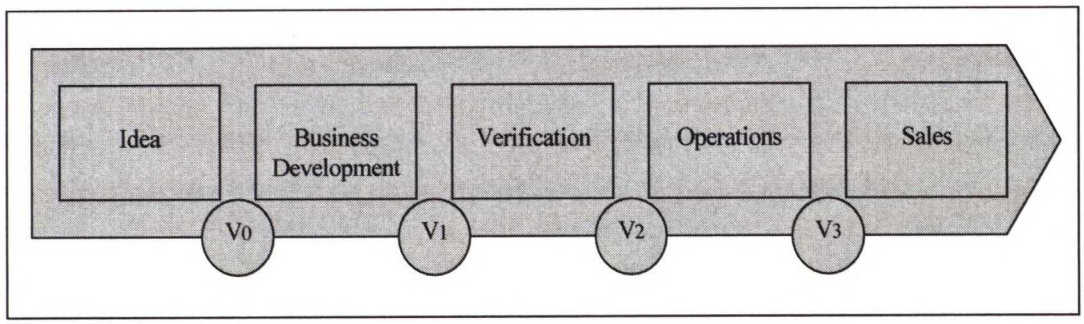


Figure 12 The V-process used in NVO venture development (Tukiainen, 2004, 63)

The Venturing process (Figure 12) was called the V-process and milestones were named V0, V1, V2 and V3. The venture is officially established at milestone V0. The purpose of the milestone is to check whether the business opportunity is worth investigating

further to the next milestones. The commitment to continue this venture and increase the headcount is obtained at milestone V1. The purpose of this milestone is to ensure that the idea, identified customer segments, product concepts and business model form a solid basis for a viable business. Milestone V2 is the official firm business commitment or approval to new business, and approval to have a direct market exposure. The purpose of the milestone is to verify that the assumptions behind the business idea are valid and the probability for the venture's success is high. At milestone V3 the venture is a fully operational business with volume sales. (Tukiainen, 2004, 63)

To link the V-Process and this study together, as a researchers comment, one could argue that all the ventures should be taken into account in the portfolio modeling in the earliest stage as possible. Should a proposal pass the V0 milestone and become a venture, it should immediately be enclosed in the portfolio models based on the prevailing assumptions of its business opportunities it has committed in the approval process. It would also be worthwhile of taking the most prominent proposals into account in reflecting them in the portfolio models to see whether their positioning could be also argued from the portfolio point of view.

4.4. Organization

In this chapter I will shortly go through the organization of NVO, and try to show how vast is the field on which NVO operates and generates its potential future ventures.

New Growth Business

The *New Growth Businesses (NGB)* unit develops and operationalizes strategic new business ideas from inside and outside the company. This is where new ventures are created and transformed into substantial, sustainable businesses. The business development team helps new ventures with their market entry strategy and business plans. The aim is to create a solid business foundation for the ventures and then provide

proactive support to help them achieve their goals. Assistance can include anything from helping ventures identify partners, to finding prototype manufacturer and to establishing pilot projects (Nokia.com/venturing, 16.4.05).

Nokia Venture Partners

Externally, Nokia has invested in *Nokia Venture Partners (NVP)*, a leading venture capital firm that invests exclusively in mobile and IP-related start-up businesses and technologies on a global level. Nokia Venture Partners invests at an early stage with investments typically ranging between 2 to 6 million US dollars initially, depending on the stage of business development, the business model, and the industry category. Launched in 1998, Nokia Venture Partners has a strong track record of leveraging its combined resources, experience, and contacts to help build successful businesses. Nokia has invested in Nokia Venture Partners to get venture rates of return in addition to real-time market feedback about new technologies and business models. Additional limited partners in the firm include Goldman Sachs, CDB WebTech, and BMC Software, among others.

Insight & Foresight

Insight & Foresight (I&F) identifies disruptive technology and market/business model developments, their drivers and consequences, and concretises emerging business opportunities for Nokia. The unit consists of users, business and technology teams, individual projects focusing on specific disruption areas, and the Innovent team in the U.S. Together they synthesize their findings to identify new business opportunities created by disruptive technological and market developments. Fundamentally, this understanding helps Nokia to pinpoint potential business opportunities and ensures that it is well placed to act upon them (Nokia.com/venturing, 16.4.05).

Innovent

Insight & Foresight's Innovent team is involved in capturing market innovations through various means, including the joint development of new ventures or partnerships. Nokia provides expertise, methodologies, and capital to help entrepreneurs turn a concept into a tangible start-up. In return, Nokia benefits from getting early exposure to innovative ideas as well as being able to communicate our vision to the market.

Nokia Ventures Organization has shown in its search for an organization that integrates new ideas and at the same time separates them from the main business that firstly new ventures need their own space. Secondly, the operation conditions shouldn't differ from those the ventures encounter in an open market and thirdly, the substantial business opportunities can arise when people change ideas, information and experiences across organizational boundaries. Fourthly NVO's model has indicated that the flexible and adaptable organizational structure is needed to ensure the swift unit change for the commercially capable ventures. And on the other hand, the ventures that are noticed to fall outside the scope of the company should quickly be divested. (Day et al., 2001, 30)

To make sure that corporate goals are not competing with personal goals NVO's four elements to reduce the conflict of interest. Trainees are *exposed* to different parts of the company to get better insights of the whole business. Employees are *rotated* and *reward* systems planned for corporate level targets. The fourth important element is also that both good and bad *news* communicated public. (Day et al, 2001, 30)

4.5. Summary

As part of the Nokia group, the specific characteristics of NVO can be identified clearly. The positioning in the organization of NVO follows well the outlining of "Innovation Venturing" presented in by Campbell et al. in Chapter 2.3. Also the decision- making

theory of Macmillan of milestone Go/Kill decisions (Chapter 2.4) match well. And what goes for the autonomy of NVO, it agrees well also with the sponsorship theory of Birkinshaw which was presented earlier in Chapter 2.4.

5. Portfolio Factors

In this chapter the aim is to give insight to the portfolio factors which have been isolated in the interviews conducted in the case organization.

5.1 Venturing Factors

To find out which factors were relevant in portfolio modeling for NVO a total of seven managers, directors and vice-presidents were interviewed in the case company. The selection of these interviewees was based on the fact that they all had to be in a position in the organization where they operated with all the products in the portfolio. This was mandatory in the selection process as one-sided point of views could have distorted the results and the reliability of the study would have suffered. Also as the study is a case study the selection of the interviewees solely from the case organization was therefore justified.

Interviews were made to A, B, C, D, E, F and G during a total period of time of 4 months. During that time four private interviews were conducted to almost every interviewee on five different interviewing days.

The persons interviewed were at the time of the interviews in high positions in NVO organization, and in terms of confidentiality either their titles or names cannot be mentioned in this forum. They all have a long history at NVO, the shortest working length being 4 years which can be considered a very long operating cycle in the world of venturing.

The interview process is depicted in Figure 13 and further explained in correspondent phase of interviews.

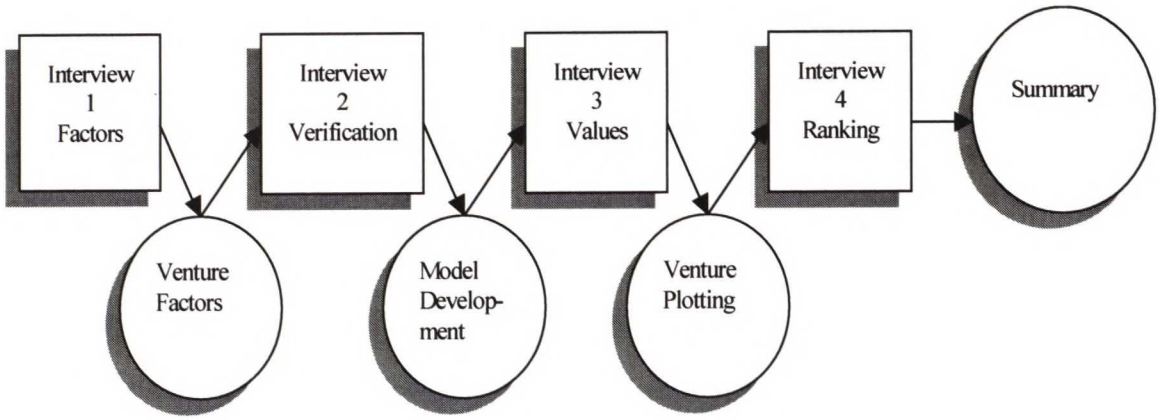


Figure 13 Interview process of the study

In the first interview a set of overall questions was sent by email to the interviewees. Although the general questions which are presented in Appendix 1, were sent always a couple of hours before the actual interview took place, none of the interviewees had the answers ready. The sharing of the questions was done only to save some time and to let the interviewees have an idea of what subjects the interview session was about.

The questions from the first interview are a collective set of questions, all relevant to the study, and some of them useful for the case organization in general and thus additional related to the study. The most relevant question of all was nevertheless the question number 11: "What venturing factors should be taken into account in the portfolio management model?"

In the first interview a total of 18 different factors were mentioned when asked "What are the most important portfolio factors to be considered in a venturing organization?" The question number 11 was not specified with any constraints such as controlling the number of the factors mentioned, neither were there any suggestions towards any options made outside the questions. After the first round of interviews, all the factors mentioned were sent to each interviewee for revision. This was the second interview

round. The aim of this was that by controlling the answers of the interviewees the reliability of the answers arose - in re-check the interviewees had the possibility to check whether there were any other factors which they did not mention in the first interview for some reason. The results of the first two interviews are presented in Table 1.

	ALL factors mentioned in interviews	A	B	C	D	E	F	G	n	%
1	Strategic Importance	X	**A**	**A**	X	X	X		6	85,71 %
2	Market Opportunity / Reward	X	X	X	X	X		X	6	85,71 %
3	Strategic-Fit	-	X	X	X	X	X		5	71,44 %
4	Time to Market / Horizon	X	X	X	-	X	X		5	71,43 %
5	Right Timing of Ventures (not all at the same time)	X	X		X	X	X		5	71,43 %
6	Competences			**A**	X	X	X	**A**	5	71,43 %
7	Risk / Uncertainty		X		**A**	**A**			3	42,86 %
8	OPEX	X		X	X				3	42,86 %
9	Growth rate	X		**A**	**A**				3	42,86 %
10	Value of portfolio				**A**		X		2	28,57 %
11	Opportunity Space	X			-			X	2	28,57 %
12	Markets			**A**		X			2	28,57 %
13	Customers			**A**		X			2	28,57 %
14	Vertical opportunities to Horizontal opportunities							X	1	14,29 %
15	Synergy between ventures							X	1	14,29 %
16	Success of Ventures			**A**	-				1	14,29 %
17	Renewal				X				1	14,29 %
18	Product, line or new market	-							0	0,00 %

Table 1 Factors mentioned in interviews

The changes to the answers from the first interview round are bolded and marked as follows: the "A" marks an added answers, and the minus sign "-"marks a removed answer of the factor on the revision round. The "n" denotes the number of answers to the factor in the row, and the "%" marks the total percentage of the interviewees who had mentioned the factor. From the figure can be seen that two factors were raised above all. Six out of seven interviewees saw the importance of "Strategic Importance"

and "Market Opportunity / Reward". Top six factors were voted by over the half of the interviewees.

On the revision round only one interviewee (F) did not make any changes to the prior round. By giving the interviewees the opportunity to revise and verify their answers from the first round the reliability of the study grew. This was very important as the group of interviewees was rather limited in the case organization.

From the results, nine the most often mentioned factors were selected for further examination - all of the chosen factors were mentioned at least in 3 of the 7 interviews. The factors are, in order of their popularity: Strategic Importance, Market Opportunity / Reward, Strategic Fit, Time to Market / Horizon, Right Timing of Ventures, Competences, Risk / Uncertainty, Operating Expenses (OPEX) and Growth Rate. In the following I will present these further selected nine factors, and in the later discussions call them collectively as the "*Venturing Factors*".

5.1.1. Strategic Importance

Strategic Importance unfolds the importance of the venture in the eyes of the whole Nokia. It is notable here to underline that the scope is not only of NVO but of the whole group. Hence this factor indicates to which extent the importance of the ventures (that fall outside the scope of the business units, as mentioned earlier), is evaluated. The scope of the whole Nokia is finally decided by the Ventures Board which assembles several executives of the business units, more thoroughly discussed in Chapter 4.2. On the other hand, even if the high-level decision making of the ventures is done in Venture Board, interviewees saw that this element is utterly important also in the NVO level to handle. It was also noted by one of the interviewees that this factor can be seen as the most important due to the fact that not everything can be measured solely in revenue.

5.1.2. Market Opportunity / Reward

As one interviewee said:"...for a venture to make a substantial difference to the whole Nokia, whose turnover is over 30 billion euros, the impact of a venture must be substantial." In this case the impact is measured by a revenue factor which is the first one of the two purely quantitative factors with the projections of the future cash flows. To recognize a business opportunity of over 500 million euros is the driving strategic outlining of NVO, mentioned in Chapter 4.1. This aim is fairly understandable, while keeping in mind that to make a major impact on a company of 30 billion euros turnover a year, the impact must be truly significant, and the planned figures must also show this. Otherwise, if a venture seems to have only cautious projections of the future markets, it will probably end up terminated in an early stage.

5.1.3. Strategic Fit

Strategic Fit discusses how well the venture suits the prevailing strategy of Nokia.
It is notable here to mention that all the ventures that were examined further have already gone through an intense examination whether they would fit to the corporate strategy. Some ventures fit better to the strategy than others. One interviewee said about the factor: "This (strategic fit) is very difficult to measure because Nokia's strategy today is very wide and thus nearly all of our ventures could therefore be seen that they fit perfectly under it." Nevertheless, this measure was still voted to be one of the most important factors, and therefore stands for its position among the factors.

5.1.4. Time to market/ Horizon

The focus of a venturing unit is strongly in the future markets. The market entry must be correctly timed - if the markets are not ready for the product it will not succeed. On the other hand if the venture is late, the business opportunity "window" might be already missed. The future horizon may also change during the course of time. For instance

replacing technologies or delays to the projected market situation may occur. It might also happen that the venture is discontinued, or put on hold.

5.1.5. Right Timing of Ventures

A portfolio of ventures was seen successful in several interviews, when it (portfolio) contains ventures with many different time frames both to markets and product launches. A balance between the ventures of the early stage and those of more mature status is seen to enable the best result and continuity to the venturing unit. Also from the resource allocation point of view, launches for new products / ventures make a big impact to the budget – if all launches would happen at the same time.

Otherwise there might occur a situation, when all of the portfolio ventures would entry the market in a short period of time, and the next possible entries could take many years.

In many interviews pronoun "right" was mentioned in discussions with the timing factor. As "timing" can stand for many things, it was seen important to keep the name of the factor as "Right timing of the ventures", and not just "Timing of the ventures. "

5.1.6. Competences / Strengths

Competences can be seen as a mix of different strengths. It is reasonable to examine the strengths as a whole, where many different characteristics are included under the factor. Employees working in developing the ventures (the venture personnel) possess skills and know-how of the specific area; these combined with technology know-how of the whole division and corporation and their innovativeness were seen in the interviews to be part of this Competences / Strengths- factor. As venturing is more or less technology and R&D related, these human related resources are seen to be as one of the most relevant operating tools in the way of creating and developing the ventures.

In all businesses and research and development activities, also in venturing resources are limited. Resources can be seen as elements of costs, whether they are pure operational expenses or headcount related costs. Skilful working force can be seen as a limited resource and a rather long-term and big investment from the company, it is also very relevant to consider how benefit most of it.

5.1.7. Risk / Probability of Success

As mentioned earlier, venturing includes a high level of risk and failures. It is a relevant part of the business, while future rests always uncertain. Risks can be seen for instance as not identifying the correct business areas where to venture, wrong timing of the ventures, delayed kill-decisions and so on. In the interviews the discussion was only of the overall risk level, and no specific risk definitions or focusing of what kind of risk were done. Venturing always contains elements of uncertainty, and from the interviews the factor was "Risk / Uncertainty". The factor itself would be a wide enough field to launch several further studies of the subject - hence it is here dealt only through a wide scope.

Giving a value to a factor "Risk" would be very difficult if not impossible – thus it has been changed into "Probability of success" as if the risks seem to be too big, the success probability suffers at the same time. Risk and probability of success are linked together in the study, as can be seen in question 10 from the question form in Appendix 2. The assumption here is made that e.g. if the risk level is 100, the success probability level is 0 and vice versa.

5.1.8 Operating Expenses

Operating expenses (later Opex) is the other of the two purely quantitative factors besides the Market Opportunity / Reward. Opex arise from the ordinary course of running a business. It consists of salaries paid to employees, research and development costs and other miscellaneous charges related to the business. In order to measure the

resources used to a venture, the financial information is always accurate, precise and objective. Opex can tell what has been the allocation between the ventures in the past, what it is now, and with budgeting can be seen what it will be in the future.

5.1.9. Growth rate

Three interviewees mentioned growth rate being one of the important factors in venturing environment. Growth rate of the venture's future, possibly still-unborn markets can be much more attractive than a more stable growth market - big market share in a rapidly growing market can give a remarkable advantage related to the competitors.

As earlier mentioned market growth is the factor of the Y-axis in the BCG-matrix, therefore it is not a new venturing specific factor, but an already existing one in the old models. In the interviews it was not discussed in what time period this factor should be measured – growth rate per year, per month and so on. That is why this factor remains probably the vaguest one of them all.

5.2 Comparison of the Venturing Factors to the Big Four

One sub-question to support the research question was to define how well the present models support the venturing environment. Also in order to answer the research question and to follow the constructive approach presented in Chapter 1.5, theoretical connections of the old models and the new ones will be presented with a crosscheck of the most important factors in internal corporate venturing (the Venturing Factors) and the earlier presented models (the Big Four).

The comparison of the Big Four (BCG, GE/McKinsey, Shell/DPM or the Risk-Reward model) and the Venturing Factors resulted to the fact that there was either no match or

only very little match between them. In Table 2 is presented the comparison between the Venturing Factors and the four well-established models, the Big Four.

Venturing Factors	BCG	GE/ McKinsey	Shell/D PM	Risk-Reward	n	%	Cooper theory
Market Opportunity / Reward				x	1	25 %	x
Competences			x		1	25 %	x
Growth rate	x				1	25 %	
Risk / Uncertainty				x	1	25 %	
Strategic Importance					0	0 %	x
Right Timing of Ventures					0	0 %	
Time to Market / Horizon					0	0 %	x
Strategic-Fit					0	0 %	x
OPEX					0	0 %	x

Table 2 The Venturing factors compared to Big Four models and Cooper theory

Only four of the Venturing Factors found match compared to the selected portfolio models, the Big Four and in all cases only one factor per portfolio model correlated. The comparison also indicated that the factors with the major relevancy (which were mentioned in most of interviews) did not find any match from the overall models. Reasons to this might be that the environment of venturing is seen through a different perspective, and that new products which haven't gotten a market yet require different factors compared to those products which are already in the markets.

In addition of the comparison to the Big Four also Coopers' theory of attaining an effective portfolio management system, presented in Chapter 3.1. is reflected in Table 2. The Venturing Factors obtained from the interviews match actually rather well with the Cooper theory. Out of nine Venturing Factors, Cooper has a match in six cases. These findings were made under the following interpretations of Coopers' venturing parameters:

Maximizing the value of the portfolio – Market Opportunity / Reward
Competitive impact on technologies – Competences
Time to completion – Time to market / Horizon

Maximizing value matches reward or opportunity, and time to completion is the same as time to market, as the milestones are planned so that the ventures are ready when they are put to markets. Competitive impact on technologies and competences are here seen to match together as it is the people with their skills that develop different technologies and thus have an impact on the competitiveness.

Briefly, the comparison states clearly that the internal corporate venturing environment requires new models and factors for the portfolio-planning than the earlier models have provided.

Conclusion 3:

As the old models do not support the venturing environment well, new portfolio models have to be developed.

5.3 Discussion

As presented earlier, it has been written in the literature that several portfolio methods are recommended to be used for better the decision-making (Wind et al, 1983, 98) (Cooper & al., 2001, 174) (Lukkaroinen et al, 1990, 28). As the previous chapter

pointed out, the old well-established models did not serve well the venturing environment, at least not from the factors point of view. Only four similar factors out of nine factors were found in the comparison, and in these cases only one per portfolio matrix model matched. In this respect it can be strongly argued that new models have to be developed for measuring the venturing environment as was stated in conclusion 1. Verification in practice of this conclusion will follow later of this study. In order to proceed with the study, a new model or several models will be developed to be able to use factors isolated from the interviews in a constructive manner.

6. Building a portfolio modeling tool

In this chapter the case organization's existing portfolio controlling and modeling systems are presented followed by the operationalization principals of the venturing factors and innovative model building. In the end also a comparison and ranking of the new and old models is presented.

6.1. Existing portfolio controlling and modeling systems

The following controlling and modeling systems, which are presented in random order, were gathered based on the interviews conducted in the case organization:

Budget

In several interviews *budget* was seen as a frame in which the unit must plan its operations. The outlining of group management in 2004 to cut down the costs of research and development resources in order them to correspond more to the normal average of the industry, had its effects also in NVO. One has to keep in mind that most of the interviews were conducted when the resource allocation plans for the venture budgeting rounds for the following half a year were on going.

V-Process

Venture Milestone planning (*V-process)*, presented more detailed in Figure 12, steers the venture for the whole lifecycle until the venture is ready to be transferred to a business unit, terminated or dealt with an alternative way.

NVO Positioning Framework

A matrix which presents values in two axes is mostly used to exhibit the scope of NVO to external (outside NVO) management meetings, and to clarify an external image in strategy and function materials. The factors in the framework are "Strategic Agenda"

and "Market opportunity". Although its popularity, there was no evidence presented to this study that there would have been any controlled and absolute values given to the matrix, and therefore it could be argued that it was quite a subjective matrix by its owner in terms of plotting the ventures to the matrix and presenting the results onwards.

Assessment Template

An *Assessment template* is regularly updated for every venture. It contains elementary information concerning the unique characteristics and strengths of the venture: Product, Technology, Markets and Personnel are elements that are controlled. This template can give a good overall understanding to the control points presented for one venture at a time although it is purely verbal, non-relative to any other venture or project and thus lacks the portfolio analyses.

NVO Metrics Scorecard

Every month, a *NVO Metrics scorecard* is updated with financial and specific venture information and they are all revised in the management team. In the scorecards, also the milestones and costs (operating expenses) from the actual period are monitored and evaluated with a traffic light grading system. Also the period highlights are brought out in the template, as a message to the management. It is notable here to mention that there are many similarities to the "Balanced scorecard model" originally presented by Kaplan and Norton. As a variation of the original model, NVO's model serves well as a strong informative way to ensure one way of steering the ventures.

Bonus Systems

Employees also have got personal bonus systems, *incentives* which are linked in their performance and achievements during a selected period of time. This rewarding system enables the management to steer the personnel to a desired direction through target setting and rewards and can thus be seen as one of the controlling systems.

In light of these controlling methods in NVO, it can be argued that there is a clear demand for an overall analysis tool which would enable an even more profound analysis and ranking of the existing ventures portfolio. The previously presented analysing tools provided insights to one or two aspects, but lacked a deeper and more objective comparison between the ventures while keeping in scope the whole portfolio itself.

System	Main scope	Portfolio aspect	Collective analysis	Visual / Verbal / Numeric
Budget	Resource allocation	no	yes	Numeric
V-Process	Venture lifecycle planning	no	yes	Visual
Positioning Framework	Introduce the scope of NVO	yes	no	Visual
Assesment Template	Strenghts and charasteristics of venture	no	yes	Verbal
Metrics Scorecard	Highlights of periods, and cost control	no	yes	Numeric, Verbal
Bonus systems	Short term plan execution	no	yes	Numeric

Figure 14 Existing Portfolio controlling and modeling systems in NVO

Figure 14 presents in brief the existing systems in the case unit. Portfolio aspect, where all the ventures are illustrated or ranked was found only in the Positioning Framework. Collective analysis, where the positioning or scoring is made by several people was found in all of the systems except for the Positioning Framework which is updated by only one person. In the Visual / Verbal / Numeric column can be seen that there are two visual systems in use in the case company: the V-process and the Positioning Framework.

Based on the previously presented and Cooper's and Koskinen et al.'s theories presented in Chapter 3.3, it can be hereby concluded that NVO is lacking a clear visual portfolio modeling tool where data could be presented in an objective way:

Conclusion 3:
The case company lacks of an objective and clear visual portfolio modeling tool

In the next phase innovativeness and construction of the solution ideas are developed and pursued which follow the steps of Kasanen's constructive study. In his earlier dissertation Kasanen states that "testing of the pragmatic adequacy of a construction takes time and requires several attempts of application" which appeared also to be the case in this study.

6.2. Operationalization of the Factors

In a constructive study, Kasanen emphasizes strongly the importance of innovative attitude: "Innovate, i.e. construct a solution idea". Innovating is never easy, and may involve also a lot of failures. When a new idea is born or developed and some questions are solved others appear. This study made no exception to this.

As the first step in the venture model operationalization, the method of how the product portfolio would be modeled was chosen. Based on Cooper et al's and Koskinen et al's studies and strong recommendations of the necessity of the visual mapping method in decision making, presented earlier in Chapter 3.3, bubble diagramming was chosen as the most suitable alternative.

After the selection of the method some boundaries had to be set up, as the innovation could not have been just a random and arbitrary process. Some of the rules or constraints follow the chosen method of visual mapping and others are based on the structure of the study itself which also brings its own restrictions:

1. The new models have to be presented in a 2-dimensional X-Y axis, in order not to loose scope and perspective of the models. Z-dimension would have made the model in 3-dimesional perspective incoherent which was checked in an early stage test-round, although it is not presented in the study more thoroughly.
2. Solely the Venturing Factors are to be used as factors
3. For the bubble sizes could be used as one additional factor. Two simply numeric factors were chosen for the consistency to be the size of the figures: operating expenses (later Opex) and market opportunity / reward.
    - The models can hereby include total of 3 different factors: X-axis, Y-axis and size. Additional data can also be included as coloring, shading, patterning and bordering in order to gain more illustrativeness and distinctiveness.
4. Relations between the chosen factors in models have to be reasonable and their relations justifiable based on the characteristics of venturing unit aspects.
5. As this study is to be conducted to be a public paper, the sizes of the bubbles are shown only in relation to each other in order not to show any sensitive data of the forecasted revenues and prognoses of the market sizes of the ventures.

The models will be presented as matrixes, where factors are given values in x-axis, y – axis and size. The size of the bubbles (ventures) presents always either "Reward" or "Opex", due to the more comprehensible comparison between these numeral measures. The other Venturing factors are more or less qualitative measures. In addition to the three factors also colouring and pattering of the bubbles are used for better identification in grouping the ventures. The colours and patterns were based on values in the assessment template (in Appendix 2) obtained in the interviews.

Based on Cooper's theory in Chapter 3.4., any pair of the mentioned factors can be used for X-and Y-axis. The same rule applies also for the Venturing Factors while taking into account the above restrictions. However as for the selected nine factors there would be

21 different variations to the X- and Y- axis as two factors were chosen to be depicted only as the size of the bubbles.

		Y-Axis						
		1	2	3	4	5	6	7
X-Axis	1	x	x	x	x	x	x	x
	2		x	x	x	x	x	x
	3			x	x	x	x	x
	4				x	x	x	x
	5					x	x	x
	6						x	x
	7							x
		6	5	4	3	2	1	0

Figure 15 Factor variations

As can be seen from Figure 15 this calculation takes into account that the same pair can appear only once as there is no value added to the study only to switch the axes.

6.3. Model building

In this chapter the new innovated and constructed models are presented. The new models are developed by the researcher based on Kasanen et al.'s phasing of a constructive research: Innovate, i.e. construct a solution idea. After the new models have been constructed they will be presented also in the case organization and then tested empirically.

Venture Factors will be planted to six new models that were developed based on the results from the conducted interviews. These six new models are named as the "Venturing Matrixes".

The factors used and their relations are also discussed. The Venturing Factors used in the new developed models have been already defined in Chapter 5.1, so the focus is to explain the nexus of the chosen factors in the models. To support this focus, examples of the venture plotting are also presented in the following chapter. The models are based on the actual interview results of which the questionnaire is presented in Appendix 2. Some of the original values have been changed and multiplied by a factor not mentioned in this study in order not to give relevant and strategic information of the case group to the open public. In addition to this precaution the results of the interviews are not shown, nor the interviewees' identities revealed.

In the following, the figures act as illustrative method to the study and do not, at least from the researchers point of view, reduce its value as representing the results in the models is not in scope of the study. Analyzing of the figures and the values is done, even if the original values have been partly changed, to aid in the verification of the usefulness of the models. Also, in the following models the exact value point is in the center of the venture bubbles.

6.3.1. Venturing Matrixes

Model 1 Strategic Fit - Strategic Importance – Reward

Model 1 involves the three most important (mentioned in most of the interviews) factors Strategic Fit, Strategic Importance and Reward. Strategic Fit and Strategic Importance have a common denominator "strategy" among them, so this was perhaps the most obvious and natural pair to choose from. It can be seen that even if a venture is seen to fit Nokia's strategy perfectly, its Strategic importance can be marginal, and possibly the Reward as well. On the other way around, a venture can be seen to fit poorly to the current strategic scope of the company, although at the same time it can be considered

to be very important strategically and in sense of revenue. This could happen for instance in a case, where the technology of the venture is not seen to be at the moment very relevant and important, but depending on the technological development it might turn into a very big business and thus have a major impact to the company.

As discussed earlier this uncertainty of the future which can also be understood as risk is one of the characteristics of venturing business.

Model 1 consist of Strategic Fit on the X-axis on a scale has been chosen to be from 0 to 10, where zero stands for no fit at all ("outside the strategy") and value 10 is the perfect fit with the prevailing strategy of the whole company. Strategic Importance is depicted on the y-axis, where values are given also on a one to ten scale. Zero value means that there is strategic importance to the company, and the highest value stands for extreme importance strategically to the company. The sizes of the bubbles represent the market opportunity/ reward in relation to the other ventures.

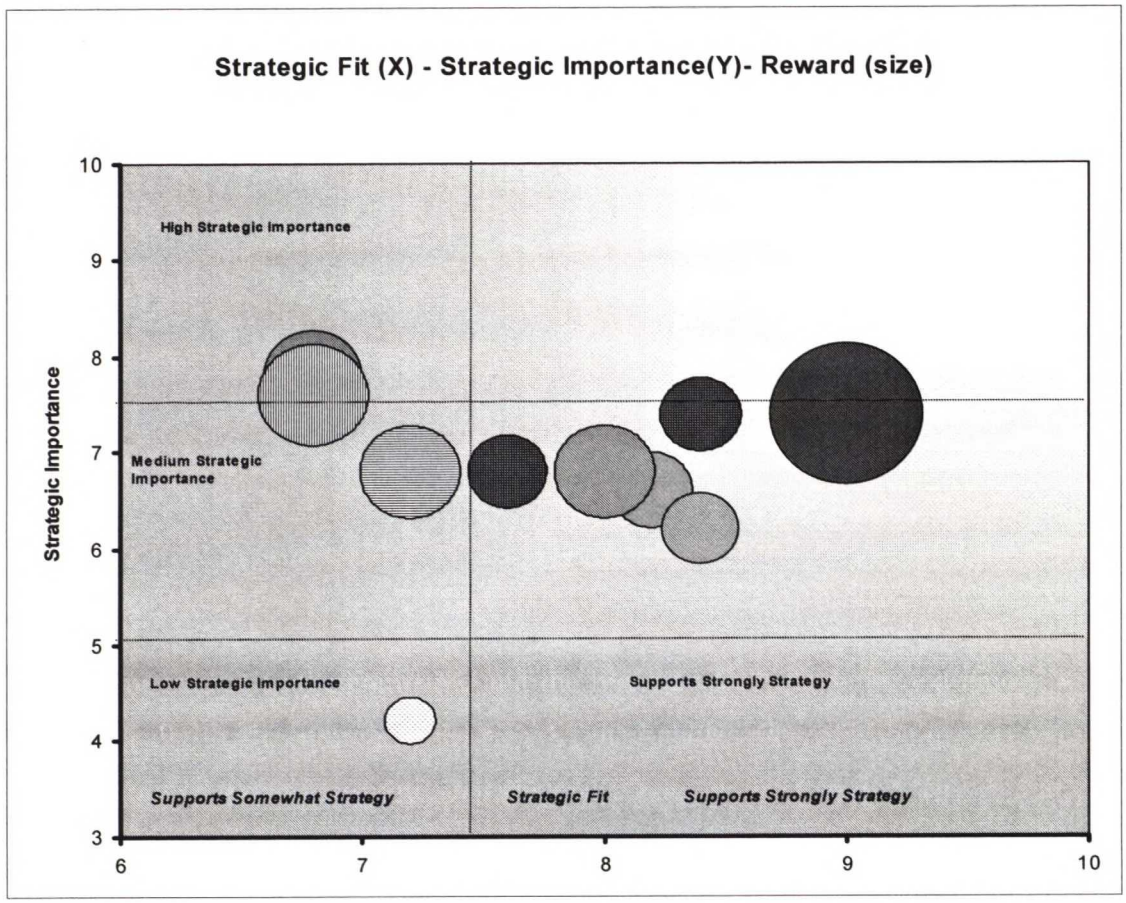


Figure 16 Model 1: Strategic Fit – Strategic Importance - Reward

As can be seen from the Figure 16, the majority of the ventures are ranked either in high or in the high-medium in Strategic Importance. This is understandable, because as discussed earlier, the strategy of the corporate can be seen as very vast, and the ventures have already gone through a set of tests and management election. One venture in the figure is clearly less important, and thereby insists a deeper study, and decision making. Also a vast majority of the ventures support fairly or very much the strategy of the group, even if other more than others. On the revenue aspect (size of the figure), it is clear that one stands out fairly much above the rest, and one is clearly less attractive in the sense.

Model 2 Competences – Success Probability – Opex

Model 2 deals with the question of how relevant are the strengths / competences of the venture while they are compared to the expected success (risk). The model constructs a set where the allocation of the scarce resources between the ventures is compared to what is seen to be the probability to succeed with the present skills and know-how.

The X-axis has been divided in three different categories in order to get a mutual understanding of the levels of competences. A negative result stands for level of competences which is worse than the competitors have, and on the other end there is high competence while zero stands for average level. On Y-axis the success probability is depicted as percentages.

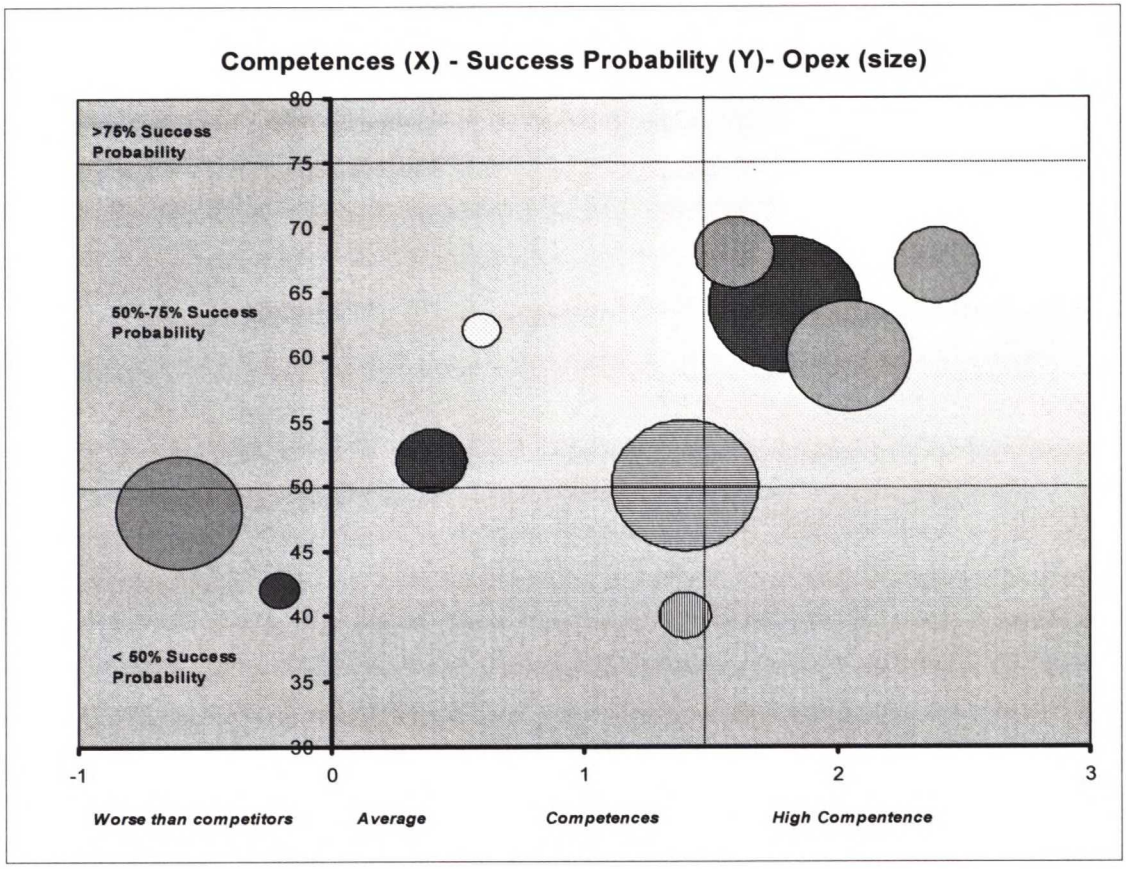


Figure 17 Model 2: Competences – Success Probability – Opex

In Figure 17 two ventures stand out as less attractive in sense of competences as they are seen to involve a worse level than competitors possess. If the figure above would reflect to actual data it should alert the management to wonder about the true success possibilities where competitors already are seen to have stronger competences. Also compared to the operating expenses one has to ponder whether it is then justified to use the scarce resources to the ventures where the competences are not at an acceptable level – worse than competitors. If a venture was seen to be strategically important one possibility to strengthen the competences would be e.g. by technology licensing. But these means are not in the scope of the study - only the ways to be able to highlight them.

For the success probability there is an interesting fact that in Figure 17 all the ventures lie under the success probability level of 75%. As mentioned earlier the uncertainty of the success is a relevant part of venturing.

Model 3 Time to Market – Strategic Importance – Reward

As time to market approaches for a venture, the strategic importance of the venture clarifies, at least in case of grown information concerning the markets, consumer's needs and applicable technology platforms.

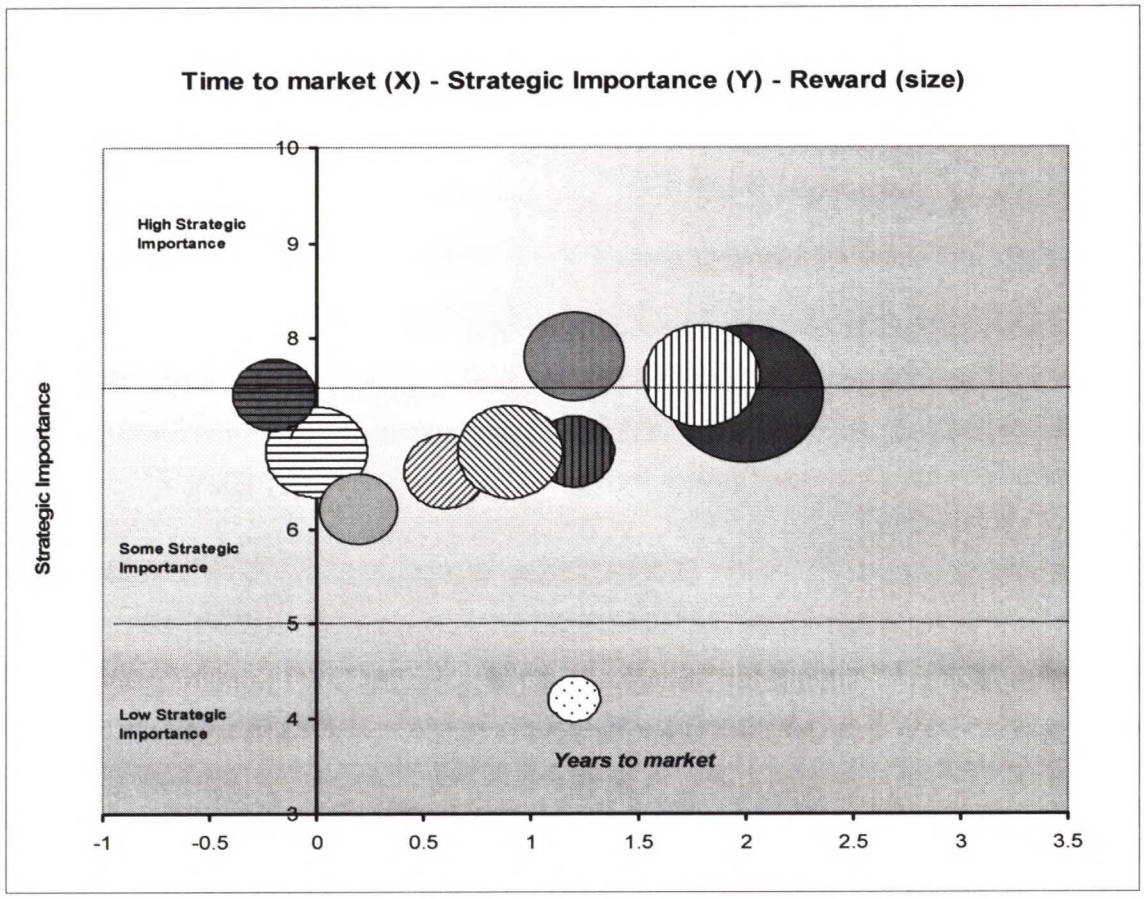


Figure 18 Model 3: Time to Market – Strategic Importance – Reward

In model 3 the factor time to market is presented with strategic importance and reward. It is important to mention here that the scale for years to market can also result from negative values – these products or ventures have already been presented to the markets, but still remain in the venturing arm of the corporate. In Figure 18 one venture has got a negative value, as it has already reached the commercial phase. The matrix enables also the management to analyze the time-to market and the relations between the ventures.

In strategic importance one venture stands out as with the low value - this would need a more profound analysis of the reasons and in a real case this should alert the management attention for further investigations and decision making.

If the Figure 18 would reflect to true values from interviews one could remark that ventures with a long time-to-market have a higher expectation of return than those closer to start of the commercial activities. Verification would require a further study but most likely coming closer to the time-to-market day makes the plans more realistic as the visibility and reliability of e.g. market information improves.

Model 4 Market ramp-up – Time to Launch – Reward

The right timing of the ventures was seen in the interviews as a very important factor. This model gives insight to the relation between the expected launch date and the maturity of the markets. To ensure a strategically beneficial timing of the venture, the launch must be prior to the ramp-up date. This enables the venture to be right-timed when the markets are ready. If the timing to the launch fails the business opportunity is either lost or radically decreased.

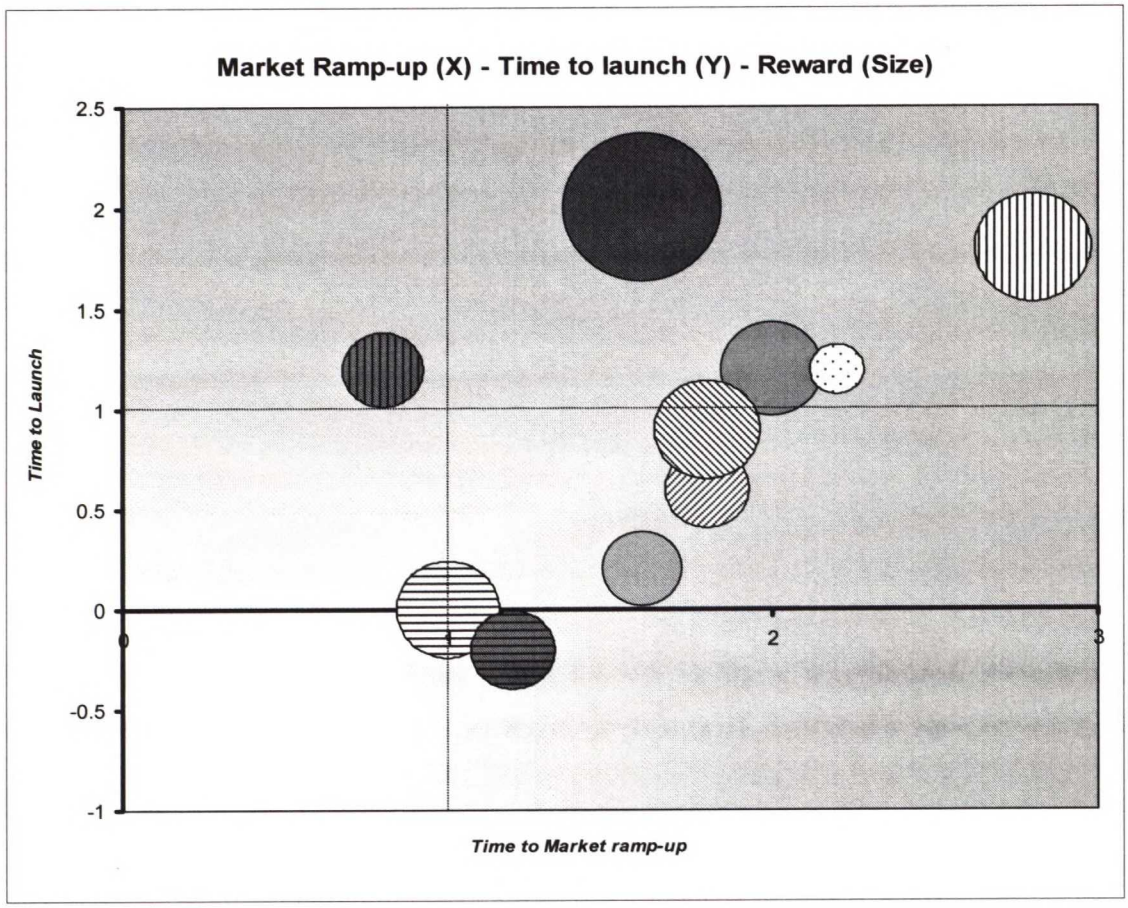


Figure 19 Model 4: Market Ramp-up – Time to launch – Reward

The numbering of X- and Y- axes stand for years. As can be seen from the picture, many of the ventures are heading for markets where ramp-ups will happen in one to two years of time. Their launches will in most of the cases happen sooner than the time-to-market dates. Expected reward of the ventures is presented with the size of the bubbles.

Model 5 Market Ramp up – Success Probability – Opex

The risk to fail with a venture should decrease when approaching the market maturity due to e.g. a more specified level of market understanding, venture development and environmental analysis. The risk of failure or choosing e.g. a wrong technology is

always greater in the beginning of the venture, when the planning window of the markets is several years ahead.

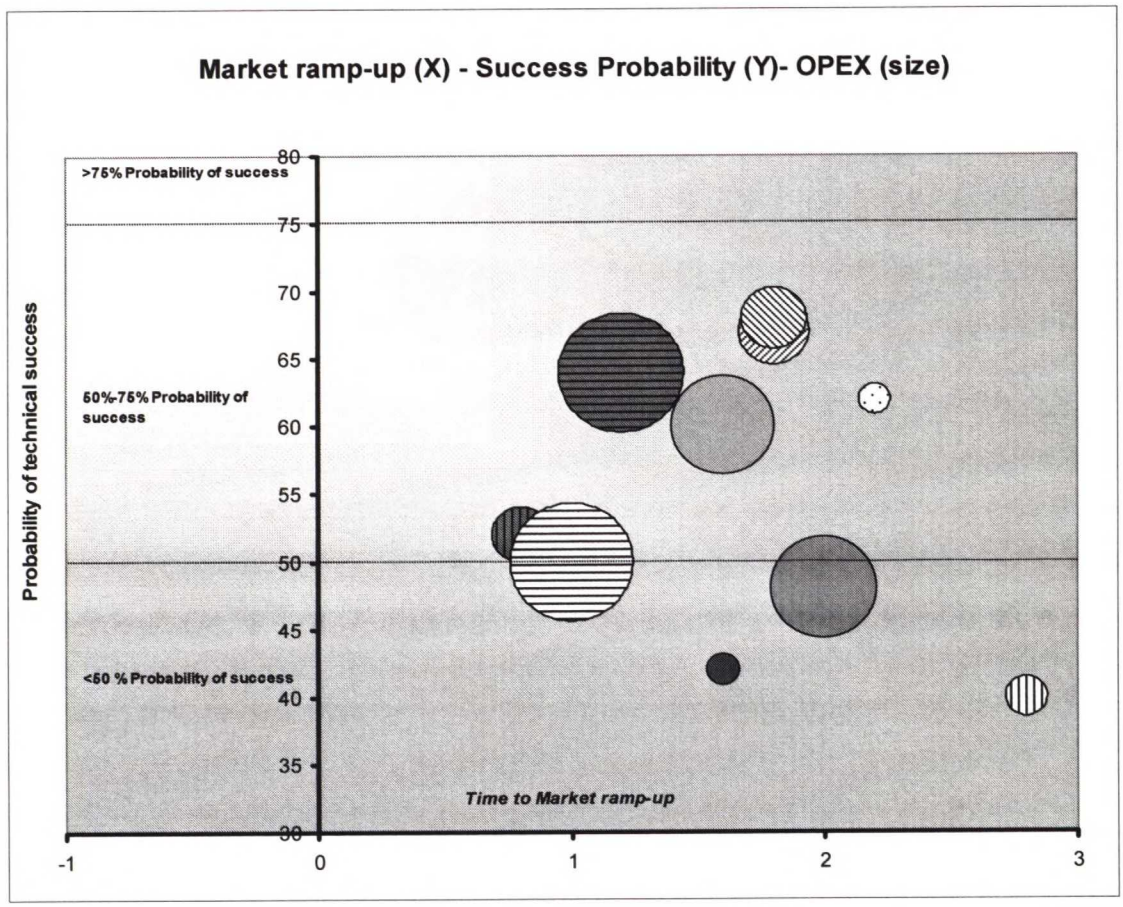


Figure 20 Model 5: Market Ramp-up – Success Probability – Opex

It would seem logical that while approaching the market ramp-up, the probability of success would peak. It is also so that the operating expenses are smaller in the beginning of the venture and arise while getting closer to the final milestones. It also important to notice here that in the figure Opex values are presented in relation to other ventures - all the bubbles do not automatically grow while approaching the market ramp-up.

In Figure 20 all the ventures are presented to be more than six months from the market ramp-up, and a majority of them have more than fifty percent of success probability. If

the figure would reflect to a real life situation, one might argue that the portfolio is not time-optimized in developing products in the focus timeframe as in most of the cases the market ramp-up is in one or two years. However it can also be that as market ramp-up and time to market are not necessarily the same and that the actual launch dates can be well in line and thus well-balanced.

Model 6 Competences – Strategic Fit – Opex

Even though the Model 6 includes a great deal of important factors mentioned in the interviews, researcher did not come up with any reasonable explanation to relations between the factors in the model. No relation between competences and strategic fit was seen to appear, and thus this model was used as test dummy to the interviewees among the other models being well argued.

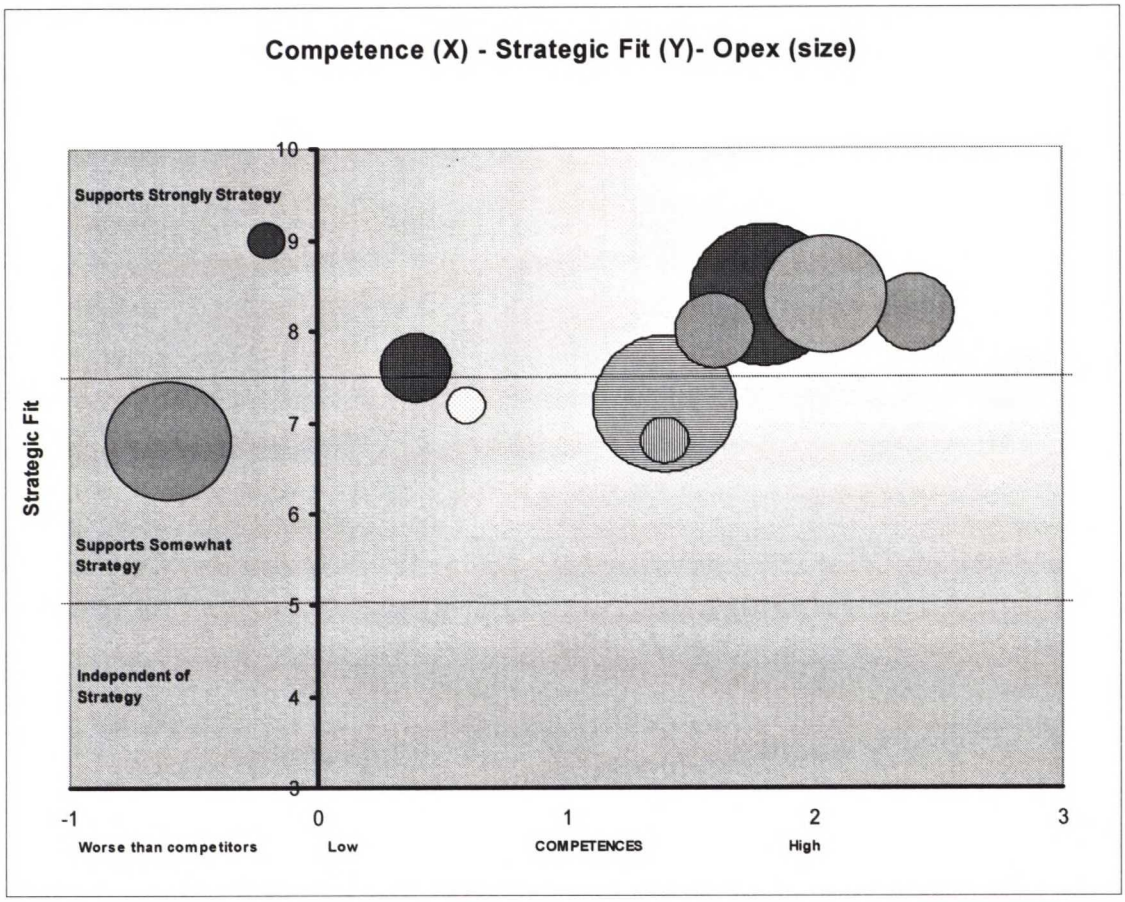


Figure 21 Model 6: Competences – Strategic Fit – Opex

In Figure 21 a few ventures have limited competences, but still support the strategy strongly. Most of the ventures would seem have high competence and strong support to the strategy.

6.3.2 The Big Four

Model 7: BCG Matrix

The following four models presented are the Big Four matrixes. Their values were also obtained from the interviews. Also the explanations to these grids have been presented in Chapter 3.5. One addition to the former examples was that colouring and shading of the bubbles were made for the easier identifying of the ventures of each other.

In Figure 22 Boston Consulting Groups matrix is presented.

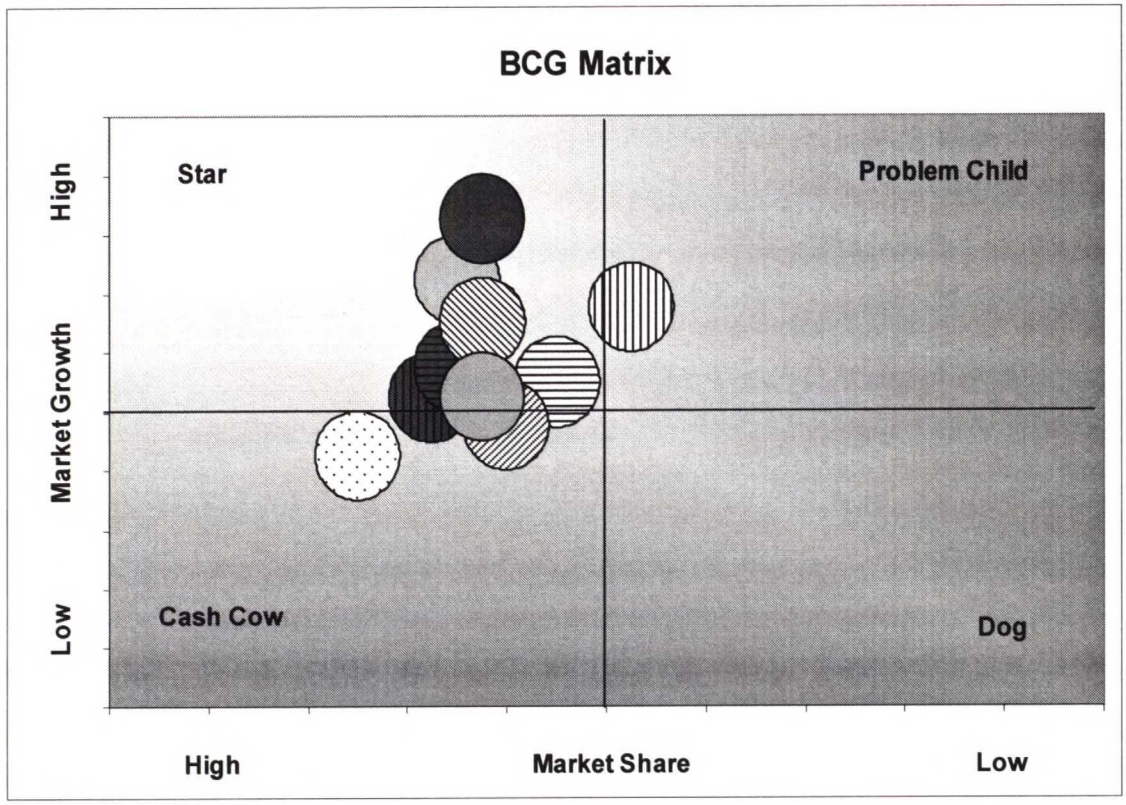


Figure 22 Model 7: BCG Matrix

There are two factors in the BCG matrix: Market share (x-axis) and Market Growth (y-axis). Colouring and patterning was added to ease the recognition of the ventures. Also shading was added to the background based on the hypotheses that the intended focus in venturing is a high market share and high market growth – that is the category "Star". This is not always the case as different targets can prevail also in a portfolio, e.g. governmentally restricted alcohol markets, where high market growth is hardly the aim - thus the hypothesis cannot be applied to every environment. Based on the interviews in the case company, for ventures the target is to gain a high market share on a fast growing market to maximise the revenues at least in the future.

In Figure 22 nearly all the ventures are presented in the "Star"-category: high market share and high market growth. The results match the ventures market focuses, but

clearly a winning venture is missing from the portfolio. On the other hand, no "loser"-product can be either identified with this model.

Model 8: GE / McKinsey Matrix

The GE & McKinsey Matrix presents market attractiveness and relative market dominance as factors. It can be argued that this model is a further refined model of the BCG/matrix. Market share and Relative market dominance depict both the presence in the markets although they are different scale or point of view. For Market growth and Market attractiveness the point of view is a bit different, but from the venturing aspect all the same – fast growing markets can be considered as the most interesting ones.

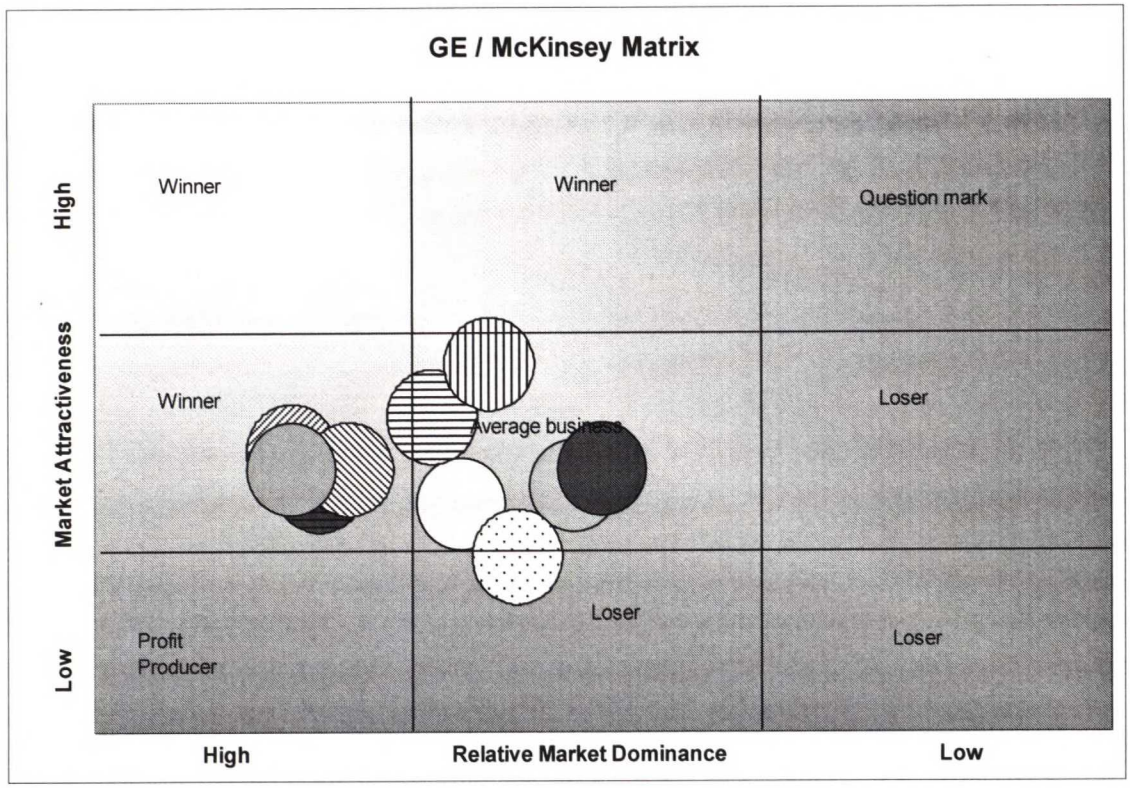


Figure 23 Model 8: GE/ McKinsey Matrix

In Figure 23 all the ventures are positioned in the positive sector of the relative market dominance as they were in the BCG-matrix in the market share. What comes to the Market attractiveness the ventures seem to have gathered together to the middle-value sector with very little scattering. Thus no venture stands out from the others in the matrix as a clear winner or as a clear loser with this GE / McKinsey model.

Model 9: Shell / DPM Matrix

The Shell / DPM model depicts the relation between the factors Competitive Capabilities (X-axis) and Business Sector prospects (Y-axis). As can be seen from Figure 24 the competitive capabilities for the ventures are valued mostly to the high sector and for the Business Sector prospects mostly in the mid-class or lower value category. There is no major dispersion in sight while examining the figure – all the ventures have gathered more or less the same values in the interviews.

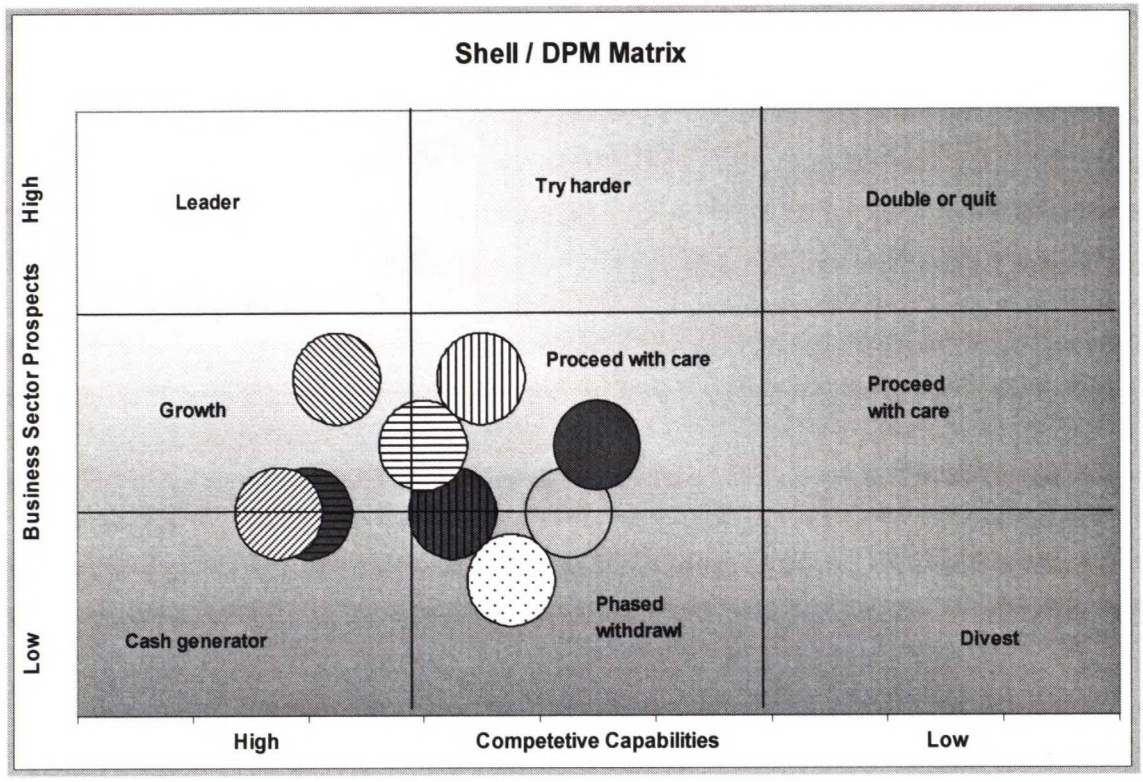


Figure 24 Model 9: Shell / DPM Matrix

The same hypothesis that was made in the previous model was also made for Figure 24: the high left side corner, that is high competitive capabilities and high business sector prospects, would be the ideal focus sector for the ventures.

Model 10: Risk-Return Matrix

The Risk-Return Matrix depicts the relation between risk and return. In risk level the ventures are mostly in the average level – no big risk projects are apparent from the matrix. From the Return aspects, most of the factors are on the higher side. No major return-wise star is apparent either, nor a very low-value venture either. As risk taking is a relevant part of the venturing, one wonders why these ventures did not get any higher values from the interviews of this factor. It is likely that the ventures have been very well filtered during the milestone process and that the markets and technology choices made have been proven to be correct. Thus it is almost apparent that the risks are at a considerable level.

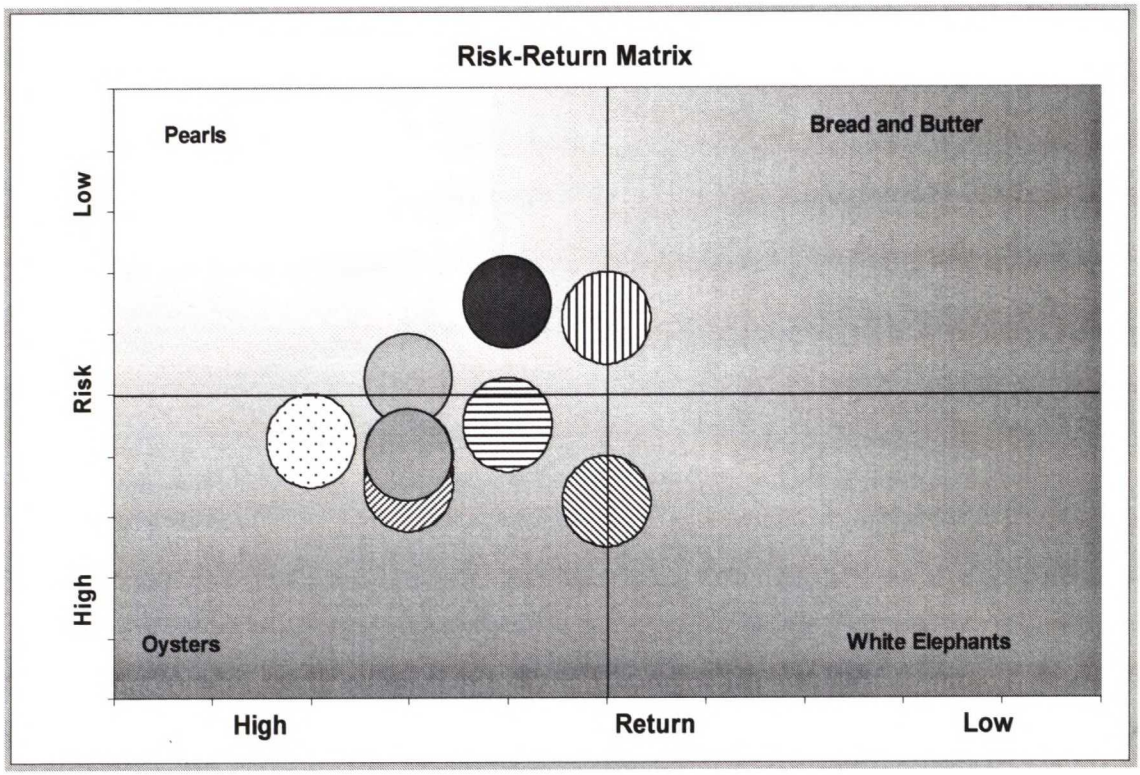


Figure 25 Model 10: Risk-Return Matrix

Overall the risk-return matrix offers a very lame point of view in the analysis of the ventures with very limited view to the real reasons behind the plotting.

6.4. Factor values

After the factors were operationalized to different models with practical explanations behind the matrixes, the interviewees were asked to give their values to the Venturing Factors they had earlier selected. It is important to mention here that the new models had not been presented to the interviewees prior to this phase so that the values they gave to the factors would not be endangered. The assessment template for this interview round can be seen in Appendix 2.

The interviewees marked their answers manually to the assessment template and for each venture at a time. Questions on the assessment template were prepared based on the earlier selected Venturing Factors. Some questions were also added in order to collect data for other internal purposes from the interviewees at the same time. Therefore there are not nine questions (as there were factors), but eleven.

In light of the Poh et al's results in their comparative analysis presented earlier in Figure 4 in Chapter 3.2. the scoring method was found to be the most suitable method in R&D project evaluation. As venturing in NVO can be seen largely as R&D project oriented, the scoring method was considered to be the best method of the study. As Visual aids in portfolio decision-making have been widely supported in the literature as presented in Chapter 3.3, Visual mapping was chosen to complete the best R&D project evaluation method, the scoring method. A combination or a hybrid of these two practises was chosen in order to have the best possible portfolio modeling tool in the study.

The scaling of the questions was generally on one to ten scale, but in case of competences (strengths in the questions) it was seen that in the rating there had to be also negative values. Therefore the scale was from –3 to +3, zero point standing for equivalence to competitors competences.

From this point onwards only interviewees A, B, C, D and E were able to contribute to the modeling process. Although interviewees F and G were not able to participate to the rest of the interviews their input to the previous stages cannot be overvalued.

6.5. Ranking the models

The following section discusses the ranking of the developed venturing models and the Big Four with values. The interviewees were asked to rank the models by giving each a number based only on the suitability of the model in the venturing environment, and not

to give any attention to the actual positioning of the ventures. This was important, because the study focuses only to modeling of the portfolio, and not on single ventures and to the fact whether the interviewees agreed with the positions of the ventures in the matrix.

Rank	Model	A	B	C	D	E	Points	VAR
1	1. Strategic Fit- Strategic Importance- Reward	1	5	2	3	3	14	2,2
2	2. Competences - Success Probability - Opex	3	3	6	1	1	14	4,2
3	6. Competence - Strategic Fit - Opex	9	2	3	2	2	18	9,3
4	3. Time To Launch - Strategic Importance - Reward	5	1	8	5	5	24	6,2
5	4. Market RampUp- Time to Launch - Reward	2	10	5	4	4	25	9,0
6	Shell/DPM: Competitive Capabilities - Business Prospects	6	7	1	6	6	26	5,7
7	Risk-Return	4	6	7	7	7	31	1,7
8	5. Market RampUp - Success Probability - Opex	8	4	4	8	8	32	4,8
9	GE/McKinsey: Market Dominance-Market Attractiveness	7	8	9	9	9	42	0,8
10	BCG: Market share- Market Growth	10	9	10	10	10	49	0,2

Table 3 Ranking of final models

From Table 3 it can be seen that - if discarding model 5 - the Big Four models placed last, and the most-well known of them all, the Boston Consulting Group matrix was ranked as the most poorly suitable matrix in the venturing environment. On the better end, models one and two obtained the same score of 14. It was likely that the Model 1 would be highly appreciated in the ranking as it featured the three most valued factors from the interviews. On the other hand the Model 2 consisted mainly of the less valued factors that were voted by less than half of the interviewees. Once variance of the answers was added to the analysis, the scale tipped the balance of the draw in favour of model 1. Variances were relatively high in models ranked from 3 to 6, and the lowest in the two most poorly fitting models to the venturing environment. As the sample size

was rather limited, no further conclusions were based on the variances. It was seen important to mention that the variances had the lowest scores in both ends of the ranking, and were at their highest in the models ranked in the middle. Thus it could be argued, with the remark of the size of the sample that the best and the worst models stood clearly out in the interviews.

As the Model 6 Competence - Strategic Fit – Opex was placed as a dummy model, the final ranking was truly a surprise. It was rated as the third best model, placing it clearly behind the top two, but notably above the other models. The reason for this was that by linking the Strategic fit with Competences and Opex it can be seen how well the limited resources are divided to the truly best fitting ventures. It is also worth mentioning here that the variance of the model 6 was the highest and thus the interviewees had the most dissension over this model.

6.6. Discussion

It was stated in this chapter that the existing portfolio modeling tools in the case company were not sufficient to give an overall view of the portfolio or any kind of ranking of the ventures in the existing portfolio. As a result to this, the factors previously obtained from interviews were operationalized to new models based on defined constraints. Six new models were innovated and developed to correspond to the specific needs of the venturing environment. Along with the new models, the four old and well-distinguished matrixes were given factor values obtained with the scoring method from interviews. Ranking of all of the models was then executed based on the results from the interviews.

Ranking of the models presented in Table 3 revealed that the new models that were solely innovated and developed to venturing environment made out best in the comparison. Although this was expected already based on the first round interviews, the results were however surprisingly obvious.

Conclusion 4:
Models innovated solely to the venturing environment were ranked best in the interviews.

After the results were obtained, the new innovated models were presented in the case organization and were taken into use by several managers responsible also for the financial results of their business; As Kasanen states that to pass the Weak market test for managerial constructions a manager responsible for the financial results of his or her business unit has to be willing to apply the construction in question in his or her actual decision making. It can therefore be concluded that the criteria of the Weak market test for managerial constructions earlier presented by Kasanen, was thus passed.

Conclusion 5:
This constructive case study passed the weak market test.

Second phase of the test, the Semi-strong market test was never in the focus of this study as it was conducted only as a case study in one organization. Passing the semi-strong market test would have required a wider study of several companies and was never the target.

7. Conclusions

This chapter presents and sums-up the key findings and conclusions of this study.

Many different portfolio managing methods are presented in literature and can be identified also by their usefulness in different environments. Based on the study by Poh et al. (2001) the scoring method was found to be the most suitable evaluating method for R&D project evaluations. It was also stated that visual aids or mapping should be part of the repertoire of portfolio models for their effective decision making characteristics and their ability to reduce the risk of misplacing the projects. In many sources it was also stated that a combination of several different portfolio managing methods e.g. hybrids could be the best alternative in many cases.

Conclusion 1:
A Combination of the Scoring method and Visual mapping should be used in portfolio modeling

Based on the portfolio modeling literature, only a limited amount of different measures are widely presented and most of them can be very useful only in industries, where different factors e.g. markets, sales numbers, products, competitors and customers are clearly identifiable. As venturing units operate more or less with future markets, substantial amount of uncertainty exists and affects also to the modeling and measuring selections.

After examining the models presented in literature, they were compared with the venturing environment in the case company. It was highlighted also in several interviews that it would be probably hard or even impossible to take into use the

existing models in their venturing unit. As a result of the examination of the old models and the needs of the venturing environment, it was concluded that as the old models do not support the venturing environment well, new portfolio models have to be developed.

Conclusion 2:
As the old models do not support the venturing environment well, new portfolio models have to be developed.

Analysis of the existing portfolio modeling tools was conducted in the case organization in order to find out how the portfolio was really managed. These findings were then compared with the recommendations in the literature, where it was clearly indicated that the scoring method was the best ranked for R&D project evaluation. In addition visual mapping was introduced as an effective decision tool which yield correct portfolio decisions in portraying the entire portfolio in a visual format and display the balance of the repertoire. As no clear, visual portfolio modeling tool with an objective view to the whole portfolio was not in use in the case unit, it was thus concluded that the case company lacks of an objective and clear visual portfolio modeling tool.

Conclusion 3:
The case company lacks of an objective and clear visual portfolio modeling tool.

Portfolio modeling factors were collected from interviews and operationalized in order to test their actual usefulness in the case organization. The factors were given values obtained from a set of interviews which would represent the insights of the interviewees in the organization. New innovated portfolio models were then given ordinal numbers by the interviewees.

The results clearly stated that the models which were innovated based on the venturing factors received the best overall ranking.

Conclusion 4:
Models innovated solely to the venturing environment were ranked best in the interviews.

This was not really a surprise, as they were built solely for the prevailing environment. At the end surprising was that all the models from the literature were appreciated very low by the interviewees. Nevertheless, this conclusion supported strongly the first conclusion that the case venturing unit needed new portfolio models.

As the study was conducted as a constructive study, it was obvious that a conclusion had to be also made of the market-based validation of managerial constructions presented in 1986 by Kasanen which was successful in the first stage, the weak market test.

Conclusion 5:
This constructive case study passed the weak market test.

In light of these four conclusion presented, it can be stated that the study was meaningful and found some new aspects both to the fields of portfolio modeling and internal corporate venturing environment.

8. Summary

Internal Venturing can be seen as one way for companies to expand and renew their core business and to possibly create entirely new markets. Over the years, the enthusiasm over venturing units has waxed and waned depending also of changes in the economic upturns and downturns. Poor economic conditions in the beginning of the new millennium resulted a rapid decrease in the volume of corporate venturing units. Much has been written about different venturing success stories but also about the defeats and shutdowns of the units and their projects. As venturing is a combination of a very risky business and an exploration of something new it is undoubtedly a fascinating area to study.

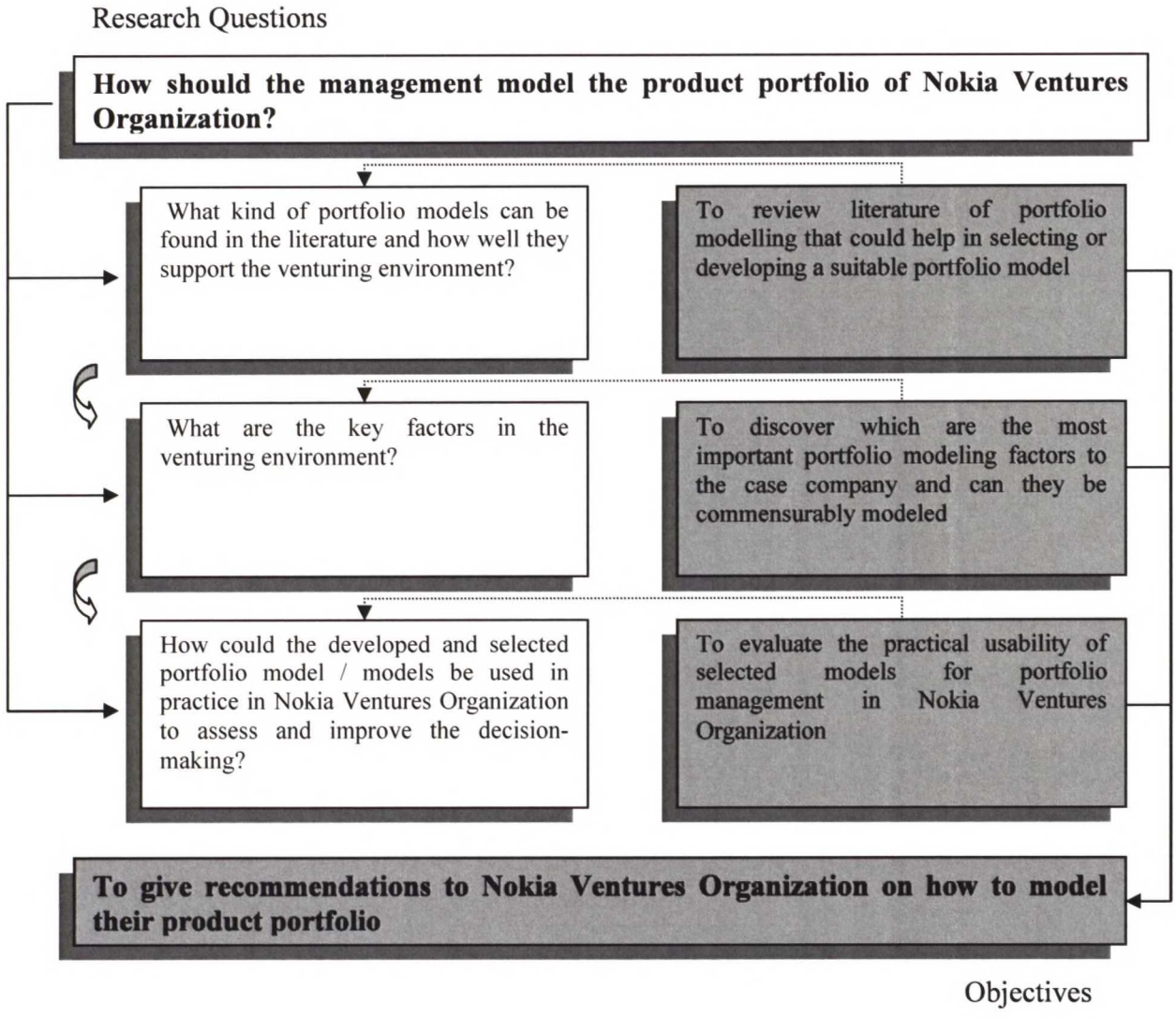
Portfolio modeling tools have been also popular in literature for many years and have been widely used and adapted to fit the purposes of many different industries. Although their popularity, there has been no study earlier where internal venturing would have been examined with a link to any kind of a portfolio managing tool. This is rather understandable as venturing can change the product portfolio and core business of a company and create totally new markets. Thus the real operations of the venturing units may have stayed beyond the reach of the public studies.

The research question of this study was "How to model the product portfolio in Nokia Ventures Organization?" To support the research question, following sub-questions were defined:

- What kind of portfolio models can be found in the literature?
- How well do portfolio models support the venturing environment?
- What are the key factors in the venturing environment?

- How could the selected and developed portfolio model or models be used in practice in Nokia Ventures Organization to assess and improve the decision-making?

The main objective of the study was to give recommendations to Nokia Ventures Organization on how to improve the current practices in their venturing portfolio modeling. Also sub-objectives were defined to support the main objective. The research questions and objectives are presented in the following figure:



The study was conducted as a constructive case study, where suggestions concerning the portfolio modeling were given based on the theories and insights of the corporate study. Innovative model structuring and building was reflected and verified over theories and empiric results. Special emphasis in the literature part was made to portfolio managing methods, visual mapping and most common portfolio models.

A comprehensive review of the literature was made in order to find out what kind of portfolio modeling tools were available and were they possibly adaptable to the venturing environment. After the examination of the models presented in literature, also called the "Big Four" in the study, a set of interviews were organized of what was really needed in the venturing environment in the case unit. The interviews gave a set of factors out of which nine key factors were then isolated for further use. Defining the key factors to the venturing environment was the second sub-question of the study and resulted to the selection of the following nine factors: Strategic Importance, Market opportunity / Reward, Strategic Fit, Time to market, Timing of the venture, Competences, Risk / Uncertainty, Operating Expenses and Growth rate. Comparison of the venturing specific factors to the four well-established portfolio matrixes resulted that only a very poor relation was apparent between the models. The analysis concluded that as the old models did not support the venturing environment well, new portfolio models had to be developed to better illustrate the new environment.

Scoring method and visual mapping were then selected based on the literature to the construction of the new portfolio models. The nine isolated factors, also called the "Venturing Factors", were then operationalized to visual portfolio models as it was concluded that the case unit lacked of an objective and clear visual portfolio modeling tool. Out of the nine venturing factors collected from interviews, six new venturing matrixes were innovated. New models were developed based on literature and results of the empiric study.

The new innovated models were then tested along with the old models by inputting values to the factors received from the interviews. In order to test the actual suitability of the models to the venturing environment, the interviewees were then asked to give ordinal numbers to the models. The following table presents the results of the ranking:

Rank	Model	A	B	C	D	E	Points	VAR
1	1. Strategic Fit- Strategic Importance- Reward	1	5	2	3	3	14	2,2
2	2. Competences - Success Probability - Opex	3	3	6	1	1	14	4,2
3	6. Competence - Strategic Fit - Opex	9	2	3	2	2	18	9,3
4	3. Time To Launch - Strategic Importance - Reward	5	1	8	5	5	24	6,2
5	4. Market RampUp- Time to Launch - Reward	2	10	5	4	4	25	9,0
6	Shell/DPM: Competitive Capabilities - Business Prospects	6	7	1	6	6	26	5,7
7	Risk-Return	4	6	7	7	7	31	1,7
8	5. Market RampUp - Success Probability - Opex	8	4	4	8	8	32	4,8
9	GE/McKinsey: Market Dominance-Market Attractiveness	7	8	9	9	9	42	0,8
10	BCG: Market share- Market Growth	10	9	10	10	10	49	0,2

Based on the results of the study it was concluded that the new models innovated solely to the venturing environment made out best in the ranking. With the exception of model 5, the old models from the literature placed last in the study and thus were found to be the less suitable to the venturing environment, while BCG being the most well-known of them took the last place.

In order to answer the third sub-question of the study, recommendations of the use of the developed portfolio models were defined and assessment and improvement suggestions to the decision-making were brought forward in the case organization.

After the results of the study were presented in the case organization, the new modeling tools were taken into use by several mangers that were responsible for the financial

results of their units. It was therefore concluded that the criteria for the weak market test of a constructive study was passed.

As a further study one could pursue whether the models innovated solely to the case organization could be taken into use in other organizations as well. It would be interesting to also obtain a more profound understanding how the key factors vary depending on the environment where the organization operates. In a wider study the semi-strong and strong market tests could also be taken into scope.

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Questionnaire for the optimal portfolio model conducted in February 2005.

APPENDIX

Appendix 1 Questions for Venturing Factors

1. What is venturing?

Success:

2. When is a venture successful?
3. And when a portfolio is considered successful?
4. How does Nokia look at the success of venturing now?
5. Where and by whom are the NVO businesses dealt with typically?
6. How does NVO measure its ventures?

Measuring and presenting NVO

7. How is the NVO product portfolio presented onwards? Is there a model nowadays?
8. How are the decisions made in NVO concerning the product portfolio?
9. What tools are now used for portfolio management in NVO?
10. Should there be additional models for portfolio management? If so, what kind?
11. What venturing factors should be taken into account in the portfolio management model?
12. Where and how would you personally see the new model being used?

About the process:

13. Who would be responsible for the new model?
14. To whom would the information be available?
15. Where could the information be available?
16. How would the information be communicated?

Appendix 2 Values to Venturing factors template

Venture

Please choose from the following questions the most suitable value

1. Strategic Fit

How does the venture fit in the Nokia Strategy?

poorly									very well	
0	1	2	3	4	5	6	7	8	9	10

2. Strategic Importance

What is the strategic importance of the venture to Nokia ?

low importance									high importance	
0	1	2	3	4	5	6	7	8	9	10

3. Competences

Strengths of Nokia (tech, people, ipr, etc) within this venture compared to competitors?

worse than competitors					same			better than competitors		
-5	-4	-3	-2	-1	0	1	2	3	4	5

4. Markets

When will the markets be ramped up in years?

allready ramped				years to ramp-up						
-3	-2	-1	0	1	2	3	4	5	6	7

5. Time-to-market

When is (was) the venture ready to be launched?

allready launched				years to launching						
-3	-2	-1	0	1	2	3	4	5	6	7

6. Reward

What will be the expected revenue to Nokia of the venture?

millions of euros										
negat.	0	50	100	150	300	500	800	1000	1500	>

7. Venture connections

Is there a connection to other ventures? Which ventures?

8. Add/ Line/ New market

The venture:

Is a product-add?

Will open a new line?

Will open a new business?

9. Market share

What will be the market share of the venture business?

low market share									high market share	
0	1	2	3	4	5	6	7	8	9	10

10. Market growth

What will be the market growth of the venture?

low market growth									high market growth	
0	1	2	3	4	5	6	7	8	9	10

11. Risk

What is the probability of success of the venture?

low success probability									high success probability	
0	1	2	3	4	5	6	7	8	9	10

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